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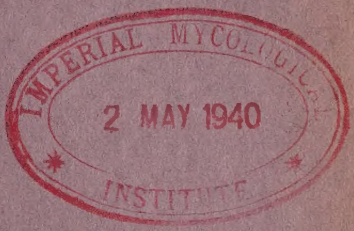

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CONTENTS

LIST OF CHIEF SUBJECTS

[Many subjects dealt with are omitted from the list and will be found in the appropriate places. Particular subjects sometimes appear under different headings: *e.g.* Tuberculosis may appear under:– Diseases caused by Bacteria and Fungi; Immunity; Diseases, General (papers on several diseases); Public Health; Therapeutics; Technique; Reports and Book Reviews].

	PAGE
DISEASES CAUSED BY BACTERIA AND FUNGI [see also Immunity]...	313-329
Streptococci	313
Anthrax	316
Tuberculosis	318
Johne's disease	323
Brucellosis	325
DISEASES CAUSED BY PROTOZOAN PARASITES	329-334
Trypanosomiasis	329
Piroplasmosis	331
Leptospirosis	333
DISEASES CAUSED BY VIRUSES ...	334-341
Foot and mouth disease	334
Swine fever	335
PARASITES IN RELATION TO DISEASE [GENERAL]	342
PARASITES IN RELATION TO DISEASE [ARTHROPODS]	342-345
PARASITES IN RELATION TO DISEASE [HELMINTHS]	345-354
General	345
Cestodes	347
Nematodes	347
IMMUNITY [including Allergic and Serological Diagnosis] ...	354-356
DISEASES, GENERAL [General diseases not dealt with under other headings: Organic Diseases, Miscellaneous Diseases and Neoplasms]	356-365
NUTRITION IN RELATION TO DISEASE [Articles placed in the section "Diseases, General" may also contain references to nutritional factors]	365-371
Mineral deficiency	365
Vitamin deficiency	369
PUBLIC HEALTH	371-374
THERAPEUTICS	374-378
Sulphamide therapy	374
POISONS AND POISONING ...	379-383
PHYSIOLOGY	383-392
TECHNIQUE AND APPARATUS ...	392-395
MISCELLANEOUS	395-397
REPORTS	397-403
Great Britain	397
South Africa	398
Southern Rhodesia	399
Sudan	399
Uganda	401
Mauritius	402
BOOK REVIEWS	403-406

INDEX TO AUTHORS

Agriculture, essays on: *Festschrift* to Sir Daniel Hall, 406.
Amoroso, E. C., Griffiths, W. F. B., & Hamilton, W. J., 392.
Anderson, G. W. See Wise, G. H., jt. author, 384.
Andrewes, C. H., & Glover, R. E., 364.
Angeloff, 316.
Antunes Tropa, E., & Pégo, F., 346.
Astwood, E. B., & Greep, R. O., 390, *bis*.
Aubertin, E., & Perrineau, G., 320.
Augustine, D. L., 350.

Baatz, H., 363.
Baer, J.-G. See Joueux, C., jt. author, 347.
Bagchi, K. N., & Ganguli, H. D., 382.
Bartlett, K. A., 343.
Bauer, H., 326.
Beach, J. R., & Twisselmann, N. M., 364.
Beaudette, F. R., & Hudson, C. B., 339.
Becka, J., 367.
Belle, G., 377.
Bennett, S. C. J., 400.
van den Berghe, L., & d'Ursel, F., 341, *bis*.
Bernadsksaya, Z. M. See Bogoroditskiĭ, A. V., jt. author, 344.
Birkhaug, K., 375.
Blanchard, L., Poisson, J., & Drieux, H., 363.
Bland, J. O. W., & Robinow, C. F., 339.
Bloch, F. See Rist, N., et al., jt. authors, 375.
Blood, symposium on, 406.
Blount, W. P., 370, 377.
von Bockelburg, U. See Hailer, E., et al., jt. authors, 317.
Bogoroditskiĭ, A. V., 332.
—, & Bernadsksaya, Z. M., 344.
Bogue, J. Y., 386.
Boko, F., 379.
Bonne, C., 362.
Bos, A. See Nieschulz, O., et al., jt. authors, 329.
Boughton, R. V., 345.
Boutrois, M. See Velu, H., jt. author, 383.
van den Branden, 329.
Branion, H. D. See LeMasurier, H. E., jt. author, 384.
Brit. med. J., 371, 375, 380.
Britton, J. W., 349.
Broicher, C. See Klein, W., jt. author, 386.
Broom, J. C. See Brown, H. C., jt. author, 356.
Brouwer, E., Frens, A. M., Reitsma, P., & Kalisvaart, C., 369.
Brown, E. W. See Nelson, W. E., et al., jt. authors, 354.
Brown, H. C., & Broom, J. C., 356.
Bruner, D. W., & Edwards, P. R., 324.
Buchanan, K. S. See Sure, B., et al., jt. authors, 369.
Bull. Hlth Org. L. o. N., 402.
Burckhardt. See Hailer, E., et al., jt. authors, 317.
Bushland, R. C. See Melvin, R., jt. author, 343.
Buxton, J. B., & Glover, R. E., 322.
Buzenac, J., 316.

Cambau, 355.
Cambel, P., 347.
Cantarow, A., Stewart, H. L., & Morgan, D. R., 376.
—. See also Stewart, H. L., jt. author, 376.
Carmichael, J., 401.
Carta, A., 360.
Ceccaldi, J. See Lwoff, M., jt. author, 329.
Césari, E., 372.
Chand, K., 378.
Chinn, B. D. See Koser, S. A., et al., jt. authors, 328.
Chorley, J. K., 399.
Chu, H. J. See Hoeppli, R., et al., jt. authors, 353.
Cloetens, R. See Verstraete, A., jt. author, 366.
Colas-Belcour, J. See Roubaud, E., jt. author, 349.
Cole, H. H., & Goss, H., 391.
Cooper, J. M. See Finnemore, H., jt. author, 382.
Cross, S. X. See Spindler, L. A., jt. author, 352.
Cummins, S. L., 320.
Curasson, G., 356.
Czarnetzky, E. J., Morgan, I. M., & Mudd, S., 313.
—, Mudd, S., Pettit, H., & Lackman, D., 313.
—. See also Mudd, S., et al., jt. authors, 313.

Dann, W. J., 370.
—, & Subbarow, Y., 370.
Darlington, C. D., 404.
Davis, J. G., & Rogers, H. J., 314.
Day, F. T., 361.
Denecke, K. See Erhardt, A., jt. author, 378.
Dickinson, E. M., & Schofield, R. H., 377.
Dodds, E. C., 389.
Donatien, A., & Lestoquard, F., 356.
Drieux, H. See Blanchard, L., et al., jt. authors, 363.
Drummond, J. C., 387.

Edgington, B. H., 379.
Edwards, P. R. See Bruner, D. W., jt. author, 324.
Ehrlich, C., 374.
Ejury, F., 385.
Engel, R. W., & Phillips, P. H., 369.
Engelbreth-Holm, J., 341.
Erhardt, A., & Denecke, K., 378.
Erlich, I., 345.
—, & Mikacić, D., 346.
Eveleth, D. F. See McNutt, S. H., et al., jt. authors, 392.

Faust, E. C., Sawitz, W., Tobie, J., Odom, V., Peres, C., & Lincicome, D. R., 394.
Feldman, W. H., 354.
Feng, L. C. See Hoeppli, R., et al., jt. authors, 353.
Finnemore, H., & Cooper, J. M., 382.
Fitch, L. W. N., Grimmett, R. E. R., & Wall, E. M., 381.
Foggie, A., & Macnab, E., 327.
Folgia, V. G. See Selye, H., jt. author, 385.
Folley, S. J., & Watson, H. M. S., 391.
Fourestier, M. See Sergent, Em., et al., jt. authors, 347.
Frappier, A., & Fredette, V., 355.
Fraser, A. C., 358.
Fredette, V. See Frappier, A., jt. author, 355.
Frens, A. M. See Brouwer, E., et al., jt. authors, 369.
Frickers, J. See Nieschulz, O., et al., jt. authors, 329.

Gaillard, H., 349.
Galliano, E. J. See Sergent, Em., et al., jt. authors, 347.
Ganguli, H. D. See Bagchi, K. N., jt. author, 382.
Gerst, V., 317.
Gey, G. O., Seegar, G. E., & Hellman, L. M., 390.
Gisske, W. See Nickel, R., jt. author, 395.
Glover, R. E. See Andrewes, C. H., jt. author, 364.
—. See also Buxton, J. B., jt. author, 322.
—. See also Griffith, A. S., jt. author, 322.
van Goidsenhoven, C., & Schoenaers, F., 330.
Gorovitz, C., 378.
Goss, H. See Cole, H. H., jt. author, 391.
Graham, R., 325.
Great Britain. Rep. Chief Med. Offr Minist. Hlth, 1938, 397.
Great Britain. Rep. Nat. Inst. Res. Dairy., Reading, 1938, 398.
Green, C. A., 394.
Greep, R. O. See Astwood, E. B., jt. author, 390, *bis*.
Grgić, A., 326.
Griffith, A. S., & Glover, R. E., 322.
Griffiths, W. F. B. See Amoroso, E. C., et al., jt. authors, 392.
Grimmett, R. E. R., & McIntosh, I. G., 381.
—, —. Wall, E. M., & Jones, G. B., 381.
—. See also Fitch, L. W. N., et al., jt. authors, 381.

Hailer, E., von Bockelburg, U., & Burckhardt, 317.
Haines, R. B., 396.
Hallmich, P., 361.
Hamilton, W. J. See Amoroso, E. C., et al. jt. authors, 392.
Hamon, V. See Rist, N., et al., jt. authors, 375.
Hare, R., 338.
Harper Adams Util. Poult. J., 359.
Harrelson, R. T., Jr. See Sure, B., et al., jt. authors, 369.
Harvey, R. A. See Ide, H. G., et al., jt. authors, 363.
Harwood, P. D. See Underwood, P. C., jt. author, 350.
Heise, F. H., & Steenken, W., Jr., 321.
Hellman, L. M. See Gey, G. O., et al., jt. authors, 390.
Hemmings, A. W. See Rimington, C., jt. author, 374.
Hendrick, J., & Moore, W., 342.
Herlitz, C. W., 319.
Hicok, H. See Whitehead, H. G. jt. author, 321.
Himmelfarb, J. K., 394.
Hjärre, A., 319.
Hobson, R. P., 342.
van der Hoeden, J., 327.
Hoeppli, R., Feng, L. C., & Chu, H. J., 353.
t'Hooft, J. P., 318.
Hudson, C. B. See Beaudette, F. R., jt. author, 339.
Huff, C. G., 333.
Hughes, D. L., 371.
Hupbauer, A., 318, *bis*.
Hutchings, B. L. See Woolley, D. W., jt. author, 314.

Ide, H. G., Harvey, R. A., & Warren, S. L. 363.
Irvine-Smith, J., 398.
Isnard, J., 382, *bis*.

Jacob, E., 331.
Jacobsohn, D. See Westman, A., jt. author, 390.
Jacotot, H., 335.
Jespersen, J., 367.
Johannsen, H., 348.
Jones, G. B. See Grimmett, R. E. R., et al., jt. authors, 381.
J. Coun. sci. industr. Res. Aust., 362.
Joyeux, C., & Baer, J.-G., 347.

Kalisvaart, C. See Brouwer, E., et al., jt. authors, 369.
Kassem, H., 387.

Kidson, E. B. See Stanton, D. J., jt. author, 366.
Kik, M. C. See Sure, B., et al., jt. authors, 369.
Klein, W., & Broicher, C., 386.
Koser, S. A., Chinn, B. D., & Saunders, F., 328.
—, & Saunders, F., 328.
Kotlán, A., 351.
Kraybill, H. R., 379.

Lackman, D. See Czarnetzky, E. J., et al., jt. authors, 313.
—. See also Mudd, S., et al., jt. authors, 313.
Lackman, D. B. See Mudd, S., et al., jt. authors, 313.
Lagerlöf, N., 361.
Laja, F., 326.
Lancet, 390.
Langer, F., 377.
Lansing, A. I., Miller, D., & Titus, H. W., 370.
Lavrent'ev, P. A., 331, 377.
Leasure, E. E., Link, R. P., & Whitlock, J. H., 384.
Lee, C. D., & Wilcke, H. L., 340.
LeMasurier, H. E., & Branion, H. D., 384.
Lestoquard, F. See Donatien, A., jt. author, 356.
Letard, E., 395.
Levine, P. P., 347.
Limbek, L., 355.
Lincicome, D. R. See Faust, E. C., et al., jt. authors, 394.
Link, R. P. See Leasure, E. E., et al., jt. authors, 384.
Lionnet, F. E., 402.
Loosli, C. G., 386.
Lovell, R., 358.
Lwoff, M., & Ceccaldi, J., 329.

McCoy, O. R., 351.
McEwen, A. D., 323.
McIntosh, I. G. See Grimmett, R. E. R., jt. author, 381.
—. See also Grimmett, R. E. R., et al., jt. authors, 381.
Macnab, E. See Foggie, A., jt. author, 327.
McNaught, K. J., & Paul, G. W., 365.
McNutt, S. H., Schwarte, L. H., & Eveleth, D. F., 392.
Manninger, R., 360.
Manohar, K. D., 315.
Marek, J., Wellmann, O., & Urbanyi, L., 366.
Markov, A. A. See Skryabin, K. I., et al., jt. authors, 342.
Megyaszai, G., 324.
Meisters, N., 367.
Melvin, R., & Bushland, R. C., 343.
Mikacić, D., 349.
—. See also Erlich, I., jt. author, 346.
Miles, A. A., & Pirie, N. W., 356.
Miller, D. See Lansing, A. I., et al., jt. authors, 370.
Mitchell, A. G. See Nelson, W. E., et al., jt. authors, 354.
Mohler, W. M., 323.
Moore, G. R. See Roberts, S. J., jt. author, 339.
Moore, W. See Hendrick, J., jt. author, 342.
Morgan, D. R. See Cantarow, A., et al., jt. authors, 376.
Morgan, I. M. See Czarnetzky, E. J., et al., jt. authors, 313.
—. See also Mudd, S., et al., jt. authors, 313.
Morton, H. E., 329.
Moxon, A. L., Olson, O. E., & Searight, W. V., 380.
Mudd, S., Czarnetzky, E. J., Lackman, D., & Pettit, H., 313.
—, Pettit, H., Lackman, D. B., & Morgan, I. M., 313.
—. See also Czarnetzky, E. J., et al., jt. authors, 313, *bis*.
—. See also Wells, W. F., et al., jt. authors, 397.
Myhill, B. A., 399.

Navarro Brazão, L. See Palmeiro, J. M., jt. author, 351.
Nelson, W. E., Mitchell, A. G., & Brown, E. W., 354.
Nichols, R. E., 392.
Nickel, R., & Gisske, W., 395.
Nicolau, S., & Ravelo, A., 332.
Nieberle, 372.
Nieschulz, O., Bos, A., & Frickers, J., 329.
Nobata, R. See Umeno, S., jt. author, 393.

Odom, V. See Faust, E. C., et al., jt. authors, 394.
Ojemann, J. G., 374.
Olson, O. E. See Moxon, A. L., et al., jt. authors, 380.
Oppermann, M., 364.
Orinsbee, R. A., 332.
Orlov, I. V., 348.
—. See also Skryabin, K. I., et al., jt. authors, 342.
Oswald, B., 344.
Overbeek, A. A., 318.
van Oyen, C., 372.

Palmeiro, J. M., & Navarro Brazão, L., 351.
Parsons, T. R., 404.
Paterson, J. S., 325.
Paul, G. W. See McNaught, K. J., jt. author, 365.
Pégo, F. See Antunes Tropa, E., jt. author, 346.
Peres, C. See Faust, E. C., et al., jt. authors, 394.
Perrineau, G. See Aubertin, E., jt. author, 320.
Peters, R. A., 383.
Petrov, A. M. See Skryabin, K. I., et al., jt. authors, 342.
Pettit, H. See Czarnetzky, E. J., et al., jt. authors, 313.
—. See also Mudd, S., et al., jt. authors, 313, *bis*.
Philippe, J., & Sissoko, M., 335.
Phillips, J. H., 350.
Phillips, P. H. See Engel, R. W., jt. author, 369.
Pirie, J. H. H., 325.
Pirie, N. W. See Miles, A. A., jt. author, 356.
Poisson, J. See Blanchard, L., et al., jt. authors, 363.
Poulton, W. F., 401.
Prickett, C. O., & Stevens, C., 393.

Rambe, L., 379.
Ramsey, E. W., 394.
Rastegar, R. See Richou, R., jt. author, 376.
Ravelo, A. See Nicolau, S., jt. author, 332.
Reitsma, P. See Brouwer, E., et al., jt. authors, 369.
Rep. Dep. Agric. Mauritius, 1937, 402.
Rep. vet. Dep. Uganda, 1938, 401.
Rhod. agric. J., 399.
Richardson, F. L., 330.
Richou, R., & Rastegar, R., 376.
Rigdon, R. H., 315.
Rimington, C., & Hemmings, A. W., 374.
Rist, N., 321, 375.
—, Bloch, F., & Hamon, V., 375.
Ristorcelli, M., 332.
Roberts, S. J., & Moore, G. R., 339.
Robinow, C. F. See Bland, J. O. W., jt. author, 339.
Robson, J. M., 390.
Rogers, H. J. See Davis, J. G., jt. author, 314.
Roubaud, E., 350.
—, & Colas-Belcour, J., 349.
Rowlands, I. W., & Young, F. G., 389.
Ryu, E., 393, *bis*.

Salyaev, V. A. See Skryabin, K. I., et al., jt. authors, 342.
San Agustin, G., 359.
Saunders, F. See Koser, S. A., jt. author, 328.
—. See also Koser, S. A., et al., jt. authors, 328.
Sawitz, W. See Faust, E. C., et al., jt. authors, 394.
Schoenaers, F. See van Goidsenhoven, C., jt. author, 330.
Schofield, R. H. See Dickinson, E. M., jt. author, 377.
Schoop, G., 393.
Schwabacher, H., & Wilson, G. S., 322.
Schwarte, L. H. See McNutt, S. H., et al., jt. authors, 392.
Searight, W. V. See Moxon, A. L., et al., jt. authors, 380.
Seegar, G. E. See Gey, G. O., et al., jt. authors, 390.
Seekles, L., 371.
Selye, H., & Folgia, V. G., 385.
Sen, K. C., 365.
Sergent, Em., Fourestier, M., & Galliano, E. J., 347.
Shanks, P. L., 357.
Sissoko, M. See Philippe, J., jt. author, 335.
Sjollema, B., 367.
Škarić, J., 327.
Skryabin, K. I., Petrov, A. M., Orlov, I. V., Markov, A. A., Tsaprun, A. A., & Salyaev, V. A., 342.
Smith, P. E. See Wintersteiner, O., jt. author, 388.
Smithburn, K. C., 321.
Söntgen, K., 352.
Southern Rhodesia, Rep. Chief Vet. Surg., S. Rhodesia, 1938, 399.
Spindler, L. A., 351.
—, & Cross, S. X., 352.
Stanton, D. J., & Kidson, E. B., 366.
Steenken, W., Jr. See Heise, F. H., jt. author, 321.
Stencl, F., 395.
Stevens, C. See Prickett, C. O., jt. author, 393.
Stewart, H. L., & Cantarow, A., 376.
—. See also Cantarow, A., et al., jt. authors, 376.
Steyn, D., 383.
Subbarow, Y. See Dann, W. J., jt. author, 370.
Sudan Government, Rep. Sudan vet. Serv. 1938, 399, 400.
Sure, B., Kik, M. C., Buchanan, K. S., Harrelson, R. T., Jr., & Theis, R. M., 369.
Swangard, W. M., 330.

Takahashi, Y., 316.
Teodoreanu, N. I., 395.
Theis, R. M. See Sure, B., et al., jt. authors, 369.
Tilley, F. W., 393.
Titus, H. W. See Lansing, A. I., et al., jt. authors, 370.
Tobie, J. See Faust, E. C., et al., jt. authors, 394.
du Toit, P. J., 343.
Tsaprun, A. A. See Skryabin, K. I., et al., jt. authors, 342.
Twisselmann, N. M. See Beach, J. R., jt. author, 364.

Uganda Protectorate, Rep. vet. Dep., Uganda, 1938, 401.
Umeno, S., & Nobata, R., 393.

Underwood, P. C., & Harwood, P. D., 350.
Union of South Africa, Rep. Direc. Abatt., Live Stk Markets, Vet. Serv. etc., Johannesburg, 1938, 398.
Urbányi, L. See Marek, J., et al., jt. authors, 366.
d'Ursel, F. See van den Berghe, L., jt. author, 341, *bis*.

Vechiu, A., 337.
Velu, H., & Boutrois, M., 383.
Verstraete, A., & Cloetens, R., 366.
Vet. Rec., 358.
Vianello, G., 334.
Videsott, R., 353.
Viera, O., 327.
Vitamin E, symposium on, 405.

Walch-Sorgdrager, B., 333.
Wall, E. M. See Fitch, L. W. N., et al., jt. authors, 381.
—. See also Grimmett, R. E. R., et al., jt. authors, 381.
Warren, R., 385.
Warren, S. L. See Ide, H. G., et al., jt. authors, 363.
Watson, H. M. S. See Folley, S. J., 391.
Wautié, M., 380.
Wellmann, O., 367.
—. See also Marek, J., et al., jt. authors, 366.
Wells, M. W. See Wells, W. F., et al., jt. authors, 397.
Wells, W. F., Wells, M. W., & Mudd, S., 397.
Werner, A. E. A., 375.
Westman, A., & Jacobsohn, D., 390.
Whitehead, H. G., & Hicok, H., 321.
Whitlock, J. H. See Leasure, E. E., et al., jt. authors, 384.
Wigglesworth, V. B., 403.
Wilcke, H. L. See Lee, C. D., jt. author, 340.
Wilkening, H., 352.
Williams, H. B., 399.
Wilson, G. S. See Schwabacher, H., jt. author, 322.
Wintersteiner, O., & Smith, P. E., 388.
Wise, G. H., & Anderson, G. W., 384.
Woolley, D. W., & Hutchings, B. L., 314.

Young, F. G. See Rowlands, I. W., jt. author, 389.

Zichis, J., 335.
Zilahy, A., 348.
Zsemlye, G., 391.

Bulletins on disease subjects written for farmers and "popular" articles of a similar nature are not included in the *Veterinary Bulletin*. Those of a sufficiently important nature, are, however, included in *Index Veterinarius*; so also are certain review articles, presidential addresses, congress proceedings, etc., where the title conveys as much information as could be given in an abstract of a few lines. For information of this nature, readers of the *Veterinary Bulletin* are referred to *Index Veterinarius*, where titles of all publications indexed by the bureau are fully cross-referenced.

INDEX VETERINARIUS.

See notice on page 3 of cover.

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Vol. 10.] **May, 1940.** [No. 5.

DISEASES CAUSED BY BACTERIA AND FUNGI

I. Mudd, S., Czarnetzky, E. J., Lackman, D., & Pettit, H. (1938). **The Antigenic Structure of Hemolytic Streptococci of Lancefield Group A. I. The Preparation of a Labile, Type-Specific Antigen ; Its Identification as the Griffith Type-Specific Agglutinogen and as a Substance from which a Group-Specific and a Type-Specific Hapten are Derivable.**—*J. Immunol.* **34.** 117-153. 12 tables. [Numerous refs.]

II. Czarnetzky, E. J., Mudd, S., Pettit, H., & Lackman, D. (1938). **The Antigenic Structure of Hemolytic Streptococci of Lancefield Group A. II. The Lability of Labile Antigen and Its Explanation ; the Isolation of Labile Antigen in Pure State ; Its Relation to Oxygen-Labile Antigenic Streptolysin.**—*Ibid.* 155-183. 12 tables. [Numerous refs.]

III. Czarnetzky, E. J., Morgan, Isabel M., & Mudd, S. (1938). **A Stable Haemolysin-Leucocidin and its Crystalline Derivative Isolated from Beta Haemolytic Streptococci.**—*J. exp. Med.* **67.** 643-656. 3 figs., 3 tables. [16 refs.]

IV. Mudd, S., Pettit, H., Lackman, D. B., & Morgan, Isabel M. (1939). **Antigenic Structure of Hemolytic Streptococci of Lancefield Group A. III. Correction.**—*J. Immunol.* **36.** 381-383. [5 refs.]

I. The authors describe a labile antigen (L.A.) which was isolated from Group A streptococci. The culture media, the strains of streptococci used, many of which were mucoid, and the chemical fractions which were isolated from the streptococci, are discussed in detail. The liquid air and the low-temperature ball mill methods were used to disintegrate the organisms. The production of a stable haemolysin is also described. The techniques of the precipitation, agglutination, phagocytosis and mouse-protection tests used in the antigenic study of the L.A. are given in full, and the significance of the tests is discussed. Antibodies against L.A. promote agglutination and phagocytosis of, and protect mice against, homologous streptococci. L.A. shows type specificity identical with that determined by the method of Griffith [*V. B.* **5.** 399]. On storage, L.A. readily loses its power of combining with homologous antibody, and this is partly due to an oxidation reaction which is readily reversible. When treated with sodium bisulphite, the antigen readily becomes haemolytic. L.A. is split by acid hydrolysis into type- and group-specific fractions which are serologically identical with Lancefield's M and C substances respectively. L.A., when in the bacterial

surface, is probably orientated so that the type-specific portion of the molecule is reactive and the group-specific portion non-reactive.

II. It is claimed that L.A. is a homomolecular substance with a molecular weight of about 100,000. When subjected to the action of sodium bisulphite it becomes haemolytic, the haemolytic power being neutralized by immune serum.

Whilst living cultures of streptococci and L.A. absorbed all or most of the antibodies from the corresponding sera, cultures which had been subjected to 56°C. for 90 minutes usually failed to do so. It is therefore claimed that the antigen is labile even when attached to the bacterial cell. The purification, estimation of molecular weight, and reversible oxidation of L.A. are described.

III. The preparation of a stable haemolysin (S.H.) and its crystalline sodium salt is described. S.H. is a hapten precipitated by sera prepared against β-haemolytic streptococci, but not by those prepared against haemolytic staphylococci. The reduction of methylene blue by leucocytes is inhibited by S.H. The chemical composition of S.H. and crystaline S.H. is given.

IV. This is a correction of the previous papers. Whilst much of the work on the antigenic structure of the antigen is correct, subsequent work has produced no evidence of spontaneous oxidation or its reversal. Neither this antigen (L.A.), nucleoproteins, nucleic acid, nor nucleotides could be rendered haemolytic by treatment with sodium bisulphite or hydrosulphite, although both of these reagents render the oxidized streptolysin of culture filtrate haemolytic. Further attempts to reproduce the haemolytic and leucocidic activity of " stable haemolysin " failed. Similar results to those described above were observed using a solution of Merck's saponin. The claim that sulphanilamide reacts with nucleoproteic agglutinogen and with other nucleoproteins and nucleic acid to render them haemolytic [CZARNETZKY, E. J., & SEVAG, M. G. (1938). *Amer. J. med. Sci.* **295.** 426.] has not been substantiated. Profound apologies are offered for these errors.—JOHN FRANCIS.

WOOLLEY, D. W., & HUTCHINGS, B. L. (1939). **Some Growth Factors for Hemolytic Streptococci.**—*J. Bact.* **38.** 285-292. 5 tables. [9 refs.]

Haemolytic streptococci have never been cultured in a medium of which the chemical composition was completely known. The authors attempted to demonstrate some of the factors necessary for the growth of these organisms. The method employed was the selective breaking down of a complex medium and determination of the factors necessary for growth. By the use of an alkali-treated medium, it was found that certain haemolytic streptococci required riboflavine, pantothenic acid and a suitable reducing compound. Vitamin C, glutathione, thioglycollic acid and reduced iron were effective reducing agents. Most of the strains examined benefited by the presence of sodium sulphide, and for some it was essential.—D. L. HUGHES.

DAVIS, J. G., & ROGERS, H. J. (1939). **The Reactions of Streptococci and Lactobacilli in Blood Agar.**—*J. Hyg., Camb.* **39.** 446-453. 1 text fig., 1 fig. on 1 plate, 4 tables. [8 refs.]

The authors studied the action in and on blood agar of a number of strains of streptococci and lactobacilli. The former included *Str. lactis, cremoris, bovis* and *thermophilus*; *viridans, pyogenes, agalactiae, faecalis* and *liquefaciens*; and numbers of the genus Leuconostoc or Betacoccus. Amongst the lactobacilli were representatives of the streptobacteria, thermobacteria and betabacteria. The criteria followed were those of Brown except that ox blood was used and autolysed yeast extract added to the plates. Some tube tests were also done.

The authors conclude that the phenomena known as γ, greening (or γ green), " bleaching ", and alpha prime (α') are of no diagnostic value on account of the complexity and variability of the reactions producing them, but that true haemolysis (β) is not appreciably altered by differences in methods, is constant and is therefore of diagnostic value ; further, that the phenomena known as weak β and α require further study. They also stress the fact that " bleaching " may be readily confused with α prime or weak β and lay emphasis on the subjective error in deciding whether a weak β strain is actually β or not.

They support the view that much of the disagreement between workers in different laboratories, especially in regard to *Streptococcus agalactiae*, is due, not only to differences in method, *e.g.* the use of blood from different animals [different peptones are another source of difference], but also to the merging of one type into another and to the ambiguity of the term " weak β ". They recommend that the term β should be used only when the zone is clear and sharply defined under a $\frac{2}{3}$ in. objective, that a simple tube test should also be done and the strain not described as haemolytic (presumably *i.e.* β) unless the result is positive. A tube test is in any case regarded as essential in doubtful cases.

It was found that true β-haemolysis only occurred with strains of *Str. pyogenes*, the so-called animal pyogenes (Group C), and some strains of *Str. agalactiae*.

—A. W. STABLEFORTH.

MANOHAR, K. D. (1939). **Epidemic in a Controlled Guinea-Pig Colony.**—*Indian J. vet. Sci.* **9.** 229-232. 2 tables. [1 ref.]

M. records an epidemic in g. pigs characterized by haemorrhagic and bronchopneumonic patches in the lungs. Following a hot spell there was heavy rain, which penetrated the quarters, soaking the animals and damaging their food. Flies were a plague. Hygienic measures, such as washing the green food and disinfecting the enclosures, failed to influence the mortality rate. A non-haemolytic streptococcus of the long chain variety was isolated from the lung lesions.—R. FISHER.

RIGDON, R. H. (1939). **Hemolysis Produced by Staphylococcus Colonies and Toxin on Agar Media Containing Various Animal Bloods.**—*J. Lab. clin. Med.* **24.** 1264-1276. 4 figs., 4 tables. [9 refs.] [Author's summary copied *verbatim*].

The blood used in the preparation of blood agar media influences the hemolysis which occurs round staphylococcus colonies. The widest hemolytic zone about any colony of the three types of blood studied, sheep, rabbit, and man, occurs on the rabbit. The hemolytic zones develop much later on human blood than on either rabbit or sheep.

There is a variation in the size of the areas of hemolysis produced by toxin on the different types of blood agar. It is shown that this may be influenced by the potency of the toxin and by the temperature.

The type of blood used in solid media is important when one considers the phenomenon of hemolysis by staphylococci.

Staphylococcus antitoxin, when added to blood agar media, inhibits the hemolysis which occurs round the colonies. Likewise, hemolysis produced by staphylococcus toxin dropped on the surface is also inhibited by the antitoxin. This process apparently is one of neutralization of the toxin by the antitoxin and is specific, since two strains of hemolytic streptococci produced hemolysis on the plates containing staphylococcus antitoxin.

BUZENAC, J. (1939). Observations cliniques concernant le traitement des staphylococcies cutanées du chien par l'anatoxine staphylococcique. **[The Treatment of Cutaneous Staphylococcosis of the Dog by Staphylococcus Toxin]**.—*Rec. Méd. vét.* **115.** 531-539.

B. treated 25 dogs suffering from acute or chronic eczema, some of which also had infection of the ears, with staphylococcus anatoxin. Many of the dogs were also suffering from interdigital cysts. The treatment consisted of injections of anatoxin at 3-4 day intervals, commencing with a dose of 0·5 c.c. and working up to 2 c.c. The pruritus, erythema and vesiculation were little modified by less than 6-8 injections. The impetigo and keratination of the skin generally responded well and complete cure was obtained in many cases. The external otitis in all cases was favourably influenced by the treatment and a proportion was cured.—D. L. H.

ANGELOFF. (1939). Milzbrandbekämpfung bei Tier und Mensch in Bulgarien. **[Anthrax Control in Man and Animals in Bulgaria]**.—*Dtsch. tierärztl. Wschr.* **47.** 457-463.

Statistics are quoted showing the occurrence of the disease in earlier years. The application of measures to ensure proper disposal of anthrax carcasses is discussed; these include payment of compensation to owners reporting losses. Examination of imported hides at various centres is obligatory; Ascoli's test is used and gave positive results with 3% of hides examined. The author uses a serum prepared by inoculating hyperimmunized horses intravenously with living virulent capsulated anthrax bacilli cultured on horse-serum agar. Four or five injections at intervals of eight days give a good serum. The opening of the carcass of an animal suspected to have died from anthrax is forbidden. For diagnosis an ear is sent, or a portion of hide from the metacarpus or metatarsus, together with the underlying blood vessels. Cultural methods are used and Ascoli's test is applied.

Prophylactic inoculations are obligatory wherever the disease exists; since 1928 vaccine has been given intradermally. Between 1931 and 1937 the double Besredka vaccine had been given to 772,350 animals and sero-vaccine to 23,072. Animals had been observed for 9 months afterwards, mortality being 0·05% in vaccinated and 0·058% in sero-vaccinated stock. Regular vaccination in army horses was introduced and the mortality, which had been 0·45%, fell to 0·06% in 1933, the same in 1934 and to 0·03% in 1935.

Trials with Mazzuchi's saponin-vaccine and other saponin and saponin-digitonin vaccines have not given good results; excessive local reactions have been experienced.

Observations on the preparation of anthrax anti-serum are included. Treatment of anthrax in troop horses with intravenous injections of 4·5 g. of neosalvarsan and 200 c.c. of antiserum has given good results.

From 1926-1936 there were 8,150 cases of anthrax in human beings in Bulgaria, with 665 deaths (8·15%). Serum treatment has been very successful.
—H. E. HARBOUR.

TAKAHASHI, Y. (1939). Étude sur la variabilité de *B. anthracis* à partir de germes isolés au micromanipulateur. **[Variations of *B. anthracis* from Cells Isolated by Micromanipulation]**.—*Ann. Inst. Pasteur.* **62.** 407-446. 17 figs., 7 tables. [Numerous refs.]

Two human and one horse strain of *B. anthracis* were examined by the preparation of cultures from single organisms. The organisms were isolated by a technique of film-culture and micromanipulation. The three strains were found

to dissociate both *in vitro* and *in vivo*. Coagulated horse serum gave the best differentiation in cultural characteristics between the R and S variants. The S colonies were round, smooth and moist, and they were regular in outline ; encapsulation of the bacilli was complete. The R colonies were rough, dry and irregular, and capsulation was rarely observed. *In vivo* the S variants were virulent ; the R variant was generally non-virulent. In some cases passage of the R variant through g. pigs brought about a return to the S type. The majority of R variants became encapsulated after animal inoculation ; this capsulation was sufficient to cause some virulence for mice. One R variant was completely uncapsulated *in vitro* and *in vivo* and avirulent for the g. pig and mouse ; on subcutaneous inoculation it provoked considerable oedema.

The horse strain grew in small, opaque colonies on agar and produced a turbidity in broth. The S and R variants of this strain behaved in a similar manner to those of the human strains. Asporogenous types were isolated from each of the strains examined ; their virulence varied considerably. They were of the R type and were generally uncapsulated. The majority of the R variants was found to confer some degree of immunity in inoculated animals.—E. C. Hulse.

I. Gerst, V. (1939). Desinfektionsversuche mit sporenhaltigem Milzbrandmaterial auf biologisch-chemischen Wege. [**Biological-Chemical Disinfection of Material Infected with Anthrax Spores**].—*Inaug. Diss., Berlin.* pp. 39. 8 tables. [Numerous refs.]

II. Hailer, E., von Bockelburg, U., & Burckhardt. (1939). Das Keimtötungsvermögen der Halogene gegenüber Milzbrandsporen. [**Sterilizing Power of Halogens for Anthrax Bacilli**].—*Arch. Hyg., Berl.* **122.** 20-43. 10 tables. [7 refs.]

I. Anthrax-spore infected material was incubated for eight days in glucose broth (varying concentrations) with the addition of small amounts of pure cultures of *Lactobacillus acidophilus*. Incubation first encouraged the formation of the vegetative form, and the acid-production of *L. acidophilus* inhibited re-formation of spores and damaged the bacilli to such an extent as to render them susceptible to comparatively weak solutions of disinfectants. Cultures were tested culturally and by g. pig inoculation, and daily pH records were made throughout incubation. Acid production of a single *acidophilus* strain fluctuated in intensity and rapidity under similar experimental conditions. The weaker acid-producing strains were found useless. Threads coated with dried anthrax spores were treated by this method and could subsequently be sterilized by a 1:5,000 iodine solution. Untreated anthrax spores were not killed by this agent. The acid treatment with *L. acidophilus* did not kill anthrax bacilli, but if followed by two minutes' heating at 80°C., the cultures were non-pathogenic for g. pigs. Similar disinfection of anthrax-infected soil or portions of hide appeared possible but less certain, as anaerobic bacteria influenced acid formation. Further work is required to determine whether the method could have practical application.

II. Dried anthrax spores were treated with different strengths of halogen solutions for varying periods (using the garnet method), then treated with sodium sulphite, suspended in sterile water and cultured in poured agar plates. Developing colonies were counted.

Isomolecular solutions killed spores as $I > Cl > Br$. Freshly isolated anthrax strains were used and there was great variation in their resistance to disinfection. Chlorine was found less effective than had previously been recorded and it is suggested that earlier workers used more dilute spore suspensions of less resistant strains. At 20°C. the majority of spores was killed within a short time, even with

very dilute halogen solutions, but a small proportion of highly resistant spores remained viable for some hours. At lower temperatures (12°C. and 4°C.) the resistant spores remained viable for still longer periods. Increase of chlorine concentration did not effect a proportionate reduction in disinfection time (all spores of one strain were killed in 3 hours with a 0·005% solution and in one hour with a 0·05% solution). The action of chlorine was not enhanced by the addition of hydrochloric acid or ammonia. Activity was slightly reduced by sodium chloride. Organic solvents reduced activity to some extent.—H. E. Harbour.

I. Hupbauer, A. (1938). Istodobno cijepljenje protiv bedrenice i šuštavca. [**Simultaneous Vaccination against Anthrax and Blackleg**].—*Jugoslov. vet. Glasn.* **18.** 183-186. 3 tables. [5 refs.] [German summary].

II. Hupbauer, A. (1938). Activacije latentnih infekcija plinovitih edema glukozidima. [**Activation of Latent Blackleg Infection by Vaccination with Glucoside Anthrax Vaccine**].—*Ibid.* 311-318. 4 tables. [16 refs.] [German summary]. [German version appeared in *Dtsch. tierärztl. Wschr.* **46.** 644-646].

I. Simultaneous vaccination with single dose vaccines against anthrax and blackleg did not cause any undesirable effect in sheep, and the resultant immunity against either or both diseases was as serviceable as when either was used alone. When administered at the same time the vaccines should be inoculated into separate sites.

II. From time to time, cases of fatal blackleg infection have been reported in cattle after treatment with single dose glucoside anthrax vaccine. As such cases were recorded in blackleg districts only, and as they did not occur in animals treated with vaccines other than the glucoside vaccine, it was assumed that the glucoside contained in the vaccine might be responsible for the losses.

Sub-lethal doses of blackleg organisms inoculated with a 0·9% solution of NaCl remained without effect on g. pigs, while the same doses given with saponin caused fatal infection. Similarly, it was found that g. pigs fed blackleg organisms survived, but that the organisms caused death if an intramuscular administration of a sterile, dilute solution of saponin was given beforehand. It was thus found that glucoside inoculations created a local predisposition to blackleg infection. H. considers that glucoside vaccines should, therefore, not be used in blackleg districts.—B. Oswald (Križevci).

I. t'Hooft, J. P. (1937). Tuberculose-bestrijding onder het rundvee in de laatste 25 jaar. [**Control of Bovine Tuberculosis in Holland in the Last 25 Years**].—*Tijdschr. Diergeneesk.* **64.** 1130-1140.

II. Overbeek, A. A. (1939). De kansen der vrijwillige rundertuberculose bestrijding. [**The Outlook Concerning Bovine Tuberculosis Control in Holland**].—*Ibid.* **66.** 512-517.

I. The author gave a survey of the history of the control of TB. in cattle in Holland during the previous 25 years. In 1898 a committee appointed by the government published a report with the conclusion that TB. control was necessary in regard to the health of the livestock, the cattle export trade, and public health.

Not until 1905 did the government enforce the measures known as the " Poels system ". According to this system the stock was examined and all animals with open TB. were destroyed and the owners compensated. From 1905 till 1910, 28,030 tuberculous cattle were slaughtered. The cost became so high that on 1st January, 1911 these measures were stopped. New measures reducing the compensation for cattle of poor quality were unfavourably received by the farmers,

and a voluntary control scheme was introduced. This was undertaken on a large scale in Friesland. In 1919 an Animal Health Service for cattle was founded in Friesland and stress was laid on the control of TB. 9,961 farms with 199,372 head of cattle had been dealt with by this service by April 1937; 63·3% of the farms were then free from TB.

In 1922, a new law came into force with regulations about state aid for the control of TB., but it did not work smoothly. In Friesland no special measures were taken against reactors to the tuberculin test; in other parts of the country they could be sold only for slaughter.

In 1928, a new law came into force based on a system of voluntary control with government advice and assistance. The number of farmers enrolled in the scheme in 1937 was about 45,000, owning 625,000 head of cattle; the number of uninfected farms was 20,000. This was a relatively small number, as there were 200,000 farms with 2·5 million cows in Holland. Mention is made of the BCG method of vaccination; it has been used only on heavily infected farms, but the author has doubts about its value for the control of the disease in the field.

II. Opinions vary considerably on the value of the present methods of combating TB. in Holland. Some are of the opinion that the results are very good, others doubt whether control will be achieved. There are still great difficulties in the isolation of reactors.

Lightly infected farms can be quickly "cleaned", but there are difficulties with heavily infected herds. O. emphasizes the need to provide isolation facilities when new byres are built. He considers that many byres could be altered without great cost, so that separate accommodation could be provided for positive and negative reactors. Unless isolation is provided on the farms the control scheme will fail. O. anticipates that the intradermal tuberculin test will be adopted and that the conjunctival test will not then be the official test.—Jac. Jansen (Utrecht).

I. Hjärre, A. (1939). Ansteckungsquelle für den Menschen über Tuberkulose bei Hunden und Katzen. [**Dogs and Cats as Sources of Tuberculosis in Man**].—*Acta tuberc. scand.* **13.** 103-124. 5 figs. 6 tables. [In German].

II. Herlitz, C. W. (1939). Die Uebertragung der Tuberkulose zwischen Menschen und gewissen Haustieren, besonders Hunden und Katzen. [**The Transmission of TB. between Domestic Animals and Man, with Special Reference to Dogs and Cats**].—*Ibid.* 125-162. 4 tables. [Numerous refs.] [In German].

I. This is an account of cases of TB. in 175 dogs and 22 cats, all of which were observed at general routine P.M. examinations at the Stockholm Veterinary College between 1908 and 1938. During the period there was a steady increase and in the last decade about 5% of the dogs and cats were found to be tuberculous. The findings are analysed with reference to age, sex, path of infection and pathogenesis, and the type of bacillus responsible for the infection.

In dogs over one year of age, males were affected three times as often as females, and the same applied roughly to the cats.

In dogs the infection was mostly *via* the respiratory tract whilst in cats it was mostly peroral.

The type of bacillus was investigated in 74 dogs and seven cats. The human type was present in 51 (70%) of the dogs and in one cat, the bovine type occurring in the rest.

The internal organs most frequently affected in dogs were the lungs, liver, pleura, kidneys, peritoneum, pericardium, spleen, myocardium, and intestine (in

descending order). In cats the corresponding order was lungs, liver, pleura, kidneys, spleen, peritoneum and myocardium.

II. The greater part of this paper is a review of literature, mainly north European and invaluable for reference. The following particulars are dealt with :– frequency of bovine and avian type of TB. in man, TB. in cattle, horses, swine, goats, sheep, fowls, cats and dogs, and the transmission of infection between these animals and man.

Original work reported consists of observations on the members of families in whose houses a tuberculous dog or cat had lived, and of the results of a questionnaire on TB. in dogs and cats, sent to veterinary practitioners in Sweden. Investigations were made on families who had owned 65 tuberculous dogs and three tuberculous cats. In the case of 52 of these dogs and one cat there was no TB. in the family, although in 20 of the dogs there had been open TB. and the animals had been in close contact with children. 15 case records of TB. in persons are given ; dogs were concerned in 13 of them and cats in two. Eight of these dogs had human type infection and had presumably been infected by their owners ; one had bovine type TB. There were no data for the remainder. One of the two cats had a bovine type infection and in the other the type was not determined. Evidence that infection had passed from animal to man was judged probable in two cases only. All the above 13 dogs and two cats had open TB.

In reply to the questionnaire 22 practitioners reported a total of 35 cases of TB. in dogs and three in cats. Eleven of the dogs had lived with tuberculous families, and in one case infection was held to have passed from dog to man, in five cases from man to dog, and in the other five cases infection might have passed in either direction.

In general the enquiry suggested that roughly one third of all cases of TB. in dogs and cats originate from tuberculous owners, and that the danger of tuberculous dogs and cats infecting their owners is not as great as might be supposed.—J. E.

Cummins, S. L. (1939). **Tuberculosis in Burma.**—*Tubercle, Lond.* **21.** 41-55 and 97-109. Numerous tables, 1 graph.

C. was informed that tuberculosis is practically unknown in Burma and says, " It may be assumed that bovine infection plays but a small part in the tuberculosis of Burma ".

Aubertin, E., & Perrineau, G. (1939). Exaltation du pouvoir pathogène ostéotrope et arthrotrope d'un souche de bacilles aviaires par surinfection avec des bacilles tuberculeux virulents ou par inoculation secondaire de colibacilles tués. [**Exaltation of the Pathogenic Osteotropic and Arthrotropic Power of a Strain of Avian Tubercle Bacilli by Subsequent Infection with Virulent Tubercle Bacilli or Killed** *Bacterium coli*].—*C. R. Soc. Biol. Paris.* **132.** 148-150. [1 ref.]

The authors have extended and confirmed their previous observations on the osteotropic and arthrotropic properties of a strain of avian tubercle bacillus. On inoculation into rabbits, this strain gave rise only to slight lesions of bones and joints. When, however, the rabbits were subsequently infected with a strain of virulent bovine tubercle bacilli, extensive lesions developed in many joints and some radiographically demonstrable lesions also developed in the bones. Only the original avian strain could be recovered from these lesions. This effect could not be demonstrated with subsequent injections of horse serum, although killed *Bact. coli* was able to provoke the phenomenon.—D. L. Hughes.

WHITEHEAD, H. G., & HICOK, Harriet. (1939). **Cultural Methods in the Diagnosis of Tuberculosis. A Comparison of Four Types of Media with Animal Inoculation for the Detection and Isolation of the Tubercle Bacillus in Clinical Practice.**—*Amer. Rev. Tuberc.* **39.** 540-550. 3 figs. on 2 plates, 4 tables. [Numerous refs.]

In an examination for tubercle bacilli of 215 specimens of various types from human disease, by direct and concentrated smears, by culture on two tubes each of four types of media, and by g. pig inoculation, Petragnani's malachite-green medium proved more efficient in promoting the growth of tubercle bacilli and in inhibiting the growth of contaminants, than Loewenstein's, Corper's or Petroff's media. The results do not warrant the substitution of the cultural method for the g. pig inoculation method, but show that both should be used for maximum reliability in laboratory diagnosis of tuberculosis.—R. O. MUIR.

RIST, N. (1938). Les lésions métastatiques produites par les bacilles tuberculeux morts enrobés dans les paraffines. [**Metastatic Lesions caused by Dead Tubercle Bacilli Embedded in Paraffin**].—*Ann. Inst. Pasteur.* **61.** 121-171. 15 figs. [Numerous refs.]

The inoculation of a suspension of dead tubercle bacilli in solid or liquid paraffin produced lesions in the lymph nodes at the inoculation site and also in the lungs. These lesions were extensive and closely resembled active tuberculosis. They were of an epithelioid nature, surrounded by an area of lymphocytes and fibrous tissue. A small droplet of paraffin containing bacilli was observed in the centre of the lesions; such a droplet was surrounded by a zone of polynuclear lymphocytes or an area of necrosis. The subcutaneous inoculation of pure paraffin alone produced very small lesions in the local lymph nodes from which it could be subsequently recovered; no inflammatory reaction occurred. Dead bacilli in a saline suspension did not tend to migrate from the inoculation site; no lesions appeared in the adjacent glands. Paraffin appeared to favour the transmission of the bacilli from the inoculation site. Numerous bacilli were found in the purulent material at the inoculation site one year or more after inoculation and the oily excipient appeared to protect the bacilli more at the inoculation site than in the metastatic lesions.—E. C. HULSE.

SMITHBURN, K. C. (1939). **Spontaneously Acquired Tuberculosis in Rhesus Monkeys.**—*Amer. Rev. Tuberc.* **39.** 675-682. 2 tables. [6 refs.]

Nine of 18 strains of tubercle bacilli, isolated from spontaneously acquired tuberculosis in Rhesus monkeys, were shown to belong to the bovine type, three by virulence tests in g. pigs and rabbits, and six by cultural characteristics on glycerolated egg-yolk medium. In the nine monkeys with infection due to the bovine type, the primary lesion was apparently in the gastro-intestinal tract. An investigation of the case history and diet of 45 monkeys suggested that four were tuberculous upon arrival in America. The significance of this finding is considered from a public health aspect.—R. O. MUIR.

HEISE, F. H., & STEENKEN, W., Jr. (1939). **Vitamin C and Immunity in Tuberculosis of Guinea Pigs.**—*Amer. Rev. Tuberc.* **39.** 794-795. [2 refs.]

Vitamin C given subcutaneously and in abundance did not influence the course of TB. in g. pigs infected with 10,000 H37 *Rv* bacilli, nor was there any influence on the vitamin C blood serum content. Tuberculin sensitivity of tuberculous g. pigs was not influenced.—F. T. BOYLE.

I. Buxton, J. B., & Glover, R. E. (1939). **Experiments in Calves on Immunity Conferred by Single and Double Injections of BCG in an Oily Excipient.**—*J. comp. Path.* **52.** 47-56. 2 tables. [7 refs.]

II. Griffith, A. S., & Glover, R. E. (1939). **Immunity Experiments on Guinea-Pigs with Killed Tubercle Bacilli and BCG.**—*Ibid.* 57-78. 3 tables. [16 refs.]

I. Two experiments are described. In one, seven tuberculin-negative calves were injected subcutaneously with living BCG organisms in olive oil, three with a dose of 5 mg. and four with a dose of 50 mg. The local reaction had practically disappeared after four months. The calves became allergic to tuberculin, but the reaction steadily decreased after the third month. Six months after vaccination all the calves with two controls were given 5 mg. of virulent bovine type tubercle bacilli by the mouth. Approximately six months later all were slaughtered. The animals receiving the larger dose of vaccine showed only slight lesions, and three inoculated with the smaller dose of vaccine and the two controls had severe lesions. The second experiment comprised eight vaccinated and three control calves. These were injected similarly to those in experiment 1, four receiving 5 mg., and four 50 mg. of vaccine.

Twelve months later five were reinoculated with a dose of 100 mg., and three with 200 mg. Two died of intercurrent infection; in the others the local reaction persisted and, on autopsy, was found to consist of caseo-purulent pockets containing acid-fast bacilli. After the second dose of vaccine, the allergic state to tuberculin was markedly increased. Six months after the second vaccination the calves were given 5 mg. of virulent bacilli *per os*. Three controls were also dosed. One died of intercurrent infection, the other two, when slaughtered after six months, showed glandular TB. Of the six remaining vaccinated animals, three were free of TB., two had slight TB. lesions and one was badly affected. This latter animal had shown but little response to the second dose of vaccine. There appeared to be no relation between the dose of vaccine used and the protection conferred.

II. Five groups of 16 g. pigs each were given repeated intraperitoneal injections with different vaccines, four dead (killed by heat at 120°C., and 60°C., and by formalin and glycerin respectively) and one living (BCG) vaccine. None of those receiving the glycerin vaccine died; 18 of those in the other groups died from the peritoneal reactions before the fourth dose. Further doses were, therefore, subcutaneous. Considerable local reaction was observed. The surviving g. pigs together with a further group of sixteen controls were tested in equal groups by either the intradermal injection or conjunctival instillation of virulent bovine bacilli. All the vaccines decreased the severity of the infection and increased the time to death in the majority of the g. pigs; BCG and the heat-killed vaccines were the most efficient, with no significant difference between them. Only one animal (vaccinated with BCG) did not show some degree of generalized TB.

—P. S. Watts.

Schwabacher, Herta, & Wilson, G. S. (1938). **The Vaccination of Guinea-Pigs with Living B.C.G., together with Observations on Tuberculous Superinfection in Rabbits.**—*J. Path. Bact.* **46.** 535-547. 5 tables. [Num. refs.]

The authors describe an unsuccessful attempt to set up in the lungs of rabbits a disease resembling the chronic type of pulmonary TB. in man, by recourse to infection and superinfection, with virulent bovine tubercle bacilli.

G. pigs previously vaccinated with living BCG were infected with virulent bovine or human tubercle bacilli. With large infecting doses there was little

difference between the vaccinated and control animals, but with small infecting doses a number of differences were observed. The results showed that under certain conditions BCG vaccine might confer some protection, but the immunity was of a comparatively low order and it is doubtful whether it was superior to that obtainable by suitable injections of dead bacteria. The effect of vaccination with BCG in g. pigs is probably to retard rather than to suppress the development of tubercle bacilli in the body, and thus to favour the occurrence of a more chronic type of the disease. After vaccination of g. pigs tuberculin sensitivity took longer to develop, and the ultimate degree of sensitivity was diminished.—S. J. GILBERT.

I. McEWEN, A. D. (1939). **Investigations on Johne's Disease of Sheep.**—*J. comp. Path.* **52.** 69-87. 3 tables. [18 refs.]

II. MOHLER, W. M. (1939). **Johne's Disease Infection of Laboratory Animals with Aid of Paraffin Oil.**—*J. Amer. vet. med. Ass.* **94.** 590-594. 2 figs.

I. The course of the disease in a flock of 300 Southdown ewes over a period of three years is described. Clinical cases occurred chiefly during the suckling period. The flock was tested with johnin prepared from a bovine strain, and it was concluded that this johnin was of little value in diagnosing the disease in sheep.

In affected sheep, there was a rapid loss of condition, cachexia, and death within 3-4 weeks in most cases ; diarrhoea was by no means a constant symptom, but in the later stages acid-fast bacilli could usually be demonstrated in the faeces. The fleece could be pulled out very easily. At autopsy there was usually slight thickening of the intestinal wall and sometimes slight corrugation. The lymph vessels draining the thickened bowel appeared as thick opaque or semi-translucent cords, with here and there small tubercles. Enlargement of the colic, but not of the mesenteric lymph nodes, was observed. Bacilli could usually be demonstrated in large numbers in the intestinal mucosa. There is a detailed description of the histological findings, the lesions being similar to those found in cattle. Typical histology was observed in one case in which no bacilli could be found ; this was thought to indicate that the infection had been overcome. All attempts to cultivate the bacilli failed, as did attempts to infect rabbits, pigs and cockerel chicks. Sucking lambs were regularly infected when fed with infective material, but adult sheep were resistant, although susceptibility probably extends beyond the weaning age.

Six calves were fed in the first few days of life with large doses of infective material from sheep. Two of these animals were destroyed *in extremis* after 18 months, and the longest period before destruction was 47 months. Clinical symptoms, faecal examinations, and P.M. results are described. One animal, after showing symptoms and having Johne's bacillus in the faeces, apparently recovered ; it was normal at 48 months with no bacilli in the faeces, although it continued to react to the johnin test. None of the other five animals recovered. Attempts to cultivate the organism from the calves were unsuccessful. Johnin tests were performed at intervals on these six animals and on normal animals. The results were not altogether reliable, but it is suggested that an increase in the skin measurement beyond 4 mm. should probably be taken as positive.

The method of spread of Johne's disease in cattle and sheep is discussed, and the necessity for further study of the allergic state in Johne's disease is emphasized.

II. In the past, animals such as cattle and sheep had been infected in every attempt by drenching, or forced feeding with virulent cultures of *Mycobacterium johnei* or ground up infected intestine. [The age of the animals infected is not given, but if adult animals were infected, this finding is contrary to those of McEWEN (see I, above)].

Attempts to infect laboratory animals by various methods had failed; a new method was, therefore, tried. *M. johnei* was grown in flasks for one month [exact method not described]; the organisms were then filtered off and an emulsion made with liquid paraffin. 2 c.c. of this emulsion was injected intraperitoneally into seven g. pigs; they all died in 32 days, P.M. examination showing nodules in various situations. Emulsions of material from these lesions in liquid paraffin or saline infected g. pigs and rabbits. There was a record of prenatal infection in g. pigs and certain vaccination experiments. Mice, rats and pigeons were also found susceptible to infection, but chickens were more resistant. Material from Johne intestines was emulsified, after treatment with antiformin, and injected into g. pigs, rabbits and chickens. After 30 days all the animals gave negative results to mammalian and avian tuberculin, but the g. pigs and rabbits gave positive reactions to johnin. All the g. pigs and rabbits were dead within six weeks of inoculation and showed microscopic and macroscopic lesions of Johne's disease. Infective material from goat intestine also infected g. pigs. In two of these, smears of heart blood taken just before death showed acid-fast organisms.

[It is felt that, although the evidence is highly suggestive, there is insufficient data presented to prove beyond all doubt that the lesions and the disease were produced by *M. johnei*].—J. Francis.

Megyaszai, G. (1939). A sertésorbánc elleni védekezésről. [**Control of Swine Erysipelas**].—*Állatorv. Közl.* **36.** 3-6.

The article contains detailed advice to practitioners regarding the indications for anti-erysipelas inoculation and the correct administration and preservation of the vaccine.—E. Martin.

Bruner, D. W., & Edwards, P. R. (1939). **A Note on the Monophasic Non-Specific Salmonella Types.**—*J. Bact.* **37.** 365-370. [16 refs.]

There are some strains of salmonella which exist in the non-specific or group phase only. They include the following :– *S. typhi-murium* var. *binns*, *S. choleraesuis* var. *kunzendorf*, *S. typhi-suis* var. *voldagsen*, *S. thompson* var. *berlin*, and *S. newport* var. *puerto-rico*. The authors show that these actually possess specific or type " H " antigens as well as their non-specific factors and should therefore be regarded as diphasic organisms. A modification of the Wassén technique was used. This consisted of the preparation of semi-solid media in test tubes, cooling to 45°C. after sterilization, and the addition of homologous serum. In the experiments here recorded the final concentration of serum was 1:1200 and the serum was a Kunzendorf one with a titre of 1:5000. The agar containing the serum is inoculated at one side of the tube with a single stab and after incubation it is shown that the homologous phase is confined to the line of the stab, whilst the heterologous phase is diffused throughout the medium. By culturing from the diffused part of the growth it was possible to isolate a specific phase from each of the five organisms mentioned. It is therefore concluded that Binns is identical with *S. typhi-murium*, Voldagsen with *S. typhi-suis*, Puerto-Rico with the Newport type and Berlin with the Thompson type. The Kunzendorf type is serologically identical with *S. cholerae-suis* but differs biochemically. [Tulloch (1939. *J. Hyg., Camb.* **39.** 324.) describes a similar technique with a small tube, open at both ends, within a tube of semi-solid media with immune serum added. The inoculation is made inside the inner tube and the isolation of the heterologous phase made from outside the inner tube. Without the addition of serum this method may be used for separating motile from non-motile organisms as the former migrate from inside to outside of the inner tube.]—R. Lovell.

PIRIE, J. H. H. (1940). **Listeria : Change of Name for a Genus of Bacteria. [Correspondence].**—*Nature, Lond.* **145.** 264.

A letter pointing out that, as *Listerella* has been found to have been given to a mycetozoan in 1906, the name used for the bacterial genus is a homonym. P., as the author who originally suggested that the bacterial genus should be named *Listerella*, suggests that it should be changed to *Listeria*.

PATERSON, J. S. (1939). **The Present Position Regarding** *Listerella monocytogenes* **Infection in Animals and Man.**—*Vet. Rec.* **51.** 873-876. [Numerous refs.]

P. discussed listerella infections in man and animals, and stated that it was apparent that these infections were much more wide-spread than was generally realized. Since the original description of *Listerella monocytogenes* by MURRAY, WEBB & SWANN (1926) who isolated the organism from an outbreak of disease in laboratory rabbits, it has been recovered from disease in South African gerbilles, and in cattle, sheep, goats and poultry.

In cattle, listerella organisms have been isolated from sporadic outbreaks of encephalitis in the U.S.A. on two occasions. Reports of ovine encephalitis due to listerella have been more common. In New Zealand, the disease is wide-spread and it has been suggested that the larvae of *Oestrus ovis* may be the vectors of the disease. P. isolated listerella from an outbreak of abortion in Dorset Horn ewes in the United Kingdom. Infection in fowls has been recorded in the U.S.A. The author has observed the disease in fowls in the United Kingdom. The disease took an epidemic form and the principal lesions were a gross oedema of the carcases and necrotic lesions of the liver. Necrosis of the myocardium was also present in some birds. Concurrent disease such as leucaemia, parasitism or infection with another organism was not infrequent.

Listerella monocytogenes has been isolated from at least ten cases of meningitis in man.

From a study of the flagellar antigens of 26 strains, P. has divided listerella into three groups. These groups bear no relationship to their original animal host. Certain similarities to the genus *Erysipelothrix* have been noted, but these similarities do not provide sufficient evidence for including *Listerella* and *Erysipelothrix* in one genus.—D. L. HUGHES.

GRAHAM, R. (1937). **Progress in the Control of Bang's Disease and Mastitis in Illinois.**—*Dairy Mfrs Conf. Manual, 1937.* pp. 155-172. 4 tables. Urbana, Illinois : College of Agriculture.

On October 1st 1937, 261 herd owners possessed more than 7,800 cattle enrolled under Project 1046. The accreditation of herds is the responsibility of the State Department of Agriculture and herds are accredited on the basis of two annual negative tests of all animals over six months old or of three successive negative tests at six-monthly periods. More than 140 practising veterinarians have qualified to conduct the rapid agglutination test for the State Department of Agriculture.

On August 1st, 1937, Federal-State forces in Illinois had tested 9,736 herds including more than 154,500 animals. Between 400 and 500 herds are being tested monthly and approximately 15% infection found. Very satisfactory results are being obtained by systematic testing and the elimination of reactors, and there is a desire on the part of cattle owners to stamp out the disease.

The State Department of Agriculture has passed regulations prohibiting the vaccination of herds with commercial living culture vaccine. The use of living vaccine is still regarded as in the experimental stage, and in preliminary tests at

the Illinois Experimental Station little encouragement has been found for its use in the control of the disease in the field ; there appeared to be a tendency for the incidence of abortion to be reduced, but the disadvantages are considered to outweigh the advantages.

The diagnosis of and preventive measures for mastitis are dealt with. G. states that if one simple, rapidly executed test is to be used [and the culture test is not considered in the paper to fall within this category], the chloride test is the most satisfactory and dependable.—F. T. Boyle.

Grgić, A. (1939). Prilog poznavanju bruceloze goveda kod nas. [**Study of the Incidence of Brucellosis in Cattle in Yugoslavia**].—*Vet. Arhiv.* **9.** 288-303. [Numerous refs.] [German summary].

The series of investigations of brucellosis in Yugoslavia was continued by G. Blood samples from 940 cattle at the Zagreb abattoir (Yugoslavia) were examined for brucellosis by means of both the agglutination test and Meinicke's clearing reaction (MKR). Eleven cases (1·17%) were found to be positive at an agglutination titre of 1:80 and 52 cases (5·53%) were doubtful. This incidence of positive cases corresponds to the average incidence throughout Yugoslavia. The two methods, *i.e.* the agglutination test and MKR, corresponded in 877 cases (93·3%), but the MKR sometimes showed negative results when there was an agglutination titre of 1:80.

In other expts. an abortin was given intradermally in doses of 0·3 c.c. ; the same abortin was also heated to 120°C. for 20 minutes and used. Both the raw and the heated abortin caused an increase of the blood agglutinin titre within 5-8 days, even in healthy animals, and it persisted for 6-8 weeks.

—B. Oswald (Križevci).

Laja, F. (1937). Brutselloosist hobustel. [**Brucellosis in Horses**].—*Eesti loomaarstl. Ring.* **13.** 231-235, **14.** 250-254. 3 tables. [17 refs.]

Blood from 152 horses with various diseases was tested for brucellosis. Taking an agglutination titre of 1:100 as indicative of infection, two horses with fistulous withers gave a positive reaction, and both had come from farms on which contagious abortion was known to exist. Staphylococci but not *Brucella abortus* were isolated from one case and *Br. abortus* from the other.—E. Ridala (Tartu).

Bauer, H. (1938). Serologische Untersuchungen über das Vorkommen der Abortus-Bang-Infektion bei Hunden. [**Serological Tests for Brucellosis in Dogs**].—*Inaug. Diss., Berlin.* pp. 37. 10 tables. [Numerous refs.]

The first part is devoted to a detailed review of literature relating to natural and artificial *Br. abortus* infection in dogs, and to the possibility of dogs acting as carriers of infection. B. submitted 227 canine sera to the agglutination test. 144 samples (63·4%) gave no reaction at any dilution, and 4% were unfit for use. The remainder showed, with two exceptions (end-points of 1:100 and 1:400), agglutination to a titre of 1:40 or under. Meinicke precipitation tests were also carried out on 86 of the sera. Cattle sera with agglutination titres of 1:50 gave weak reactions to the Meinicke test, while those with titres of 1:100 gave strong reactions. With the canine sera 3 positive and 2 doubtful reactions were observed, the remaining 81 being negative. Comparison with agglutination results suggested that these reactions with the canine sera were non-specific. All occurred in cases of kidney disease.

Analysis of results suggested that *Br. abortus* infection in town dogs is very rare, but that in farm dogs a small proportion (2% in this case) may be infected.

—H. E. Harbour.

ŠKARIĆ, J. (1938). Malteška groznica u primorskoj banovini. [**Undulant Fever in Dalmatia**].—*Glasn. hig. Zav.* **21.** 157-160.

Undulant fever was recorded by Š. in Dalmatia in 1923. About the same time DJUNKOVSKI and ČOLAK diagnosed the infection in goats in southern Serbia (Yugoslavia). In Dalmatia the disease seems to have become less frequent, as out of 277 blood samples obtained from suspected human patients, only 13 (4·77%) were found positive.—B. OSWALD (KRIŽEVCI).

FOGGIE, A., & MACNAB, E. (1939). *Clostridium welchii* (**Type D**) **in Lambs in Northern Ireland.**—*Vet. Rec.* **51.** 951-954. 2 tables. [9 refs.]

Pulpy kidney disease in lambs due to *Cl. welchii* (Type D) occurs in Northern Ireland and causes annual losses of from 3 to 15% on farms where the disease is endemic. The authors inoculated 1,623 lambs on 27 farms, each with 2 c.c. of type D antiserum, leaving 1,634 controls. Mortality in the controls was 3·6%, while that in the treated group was only 0·6%. The presence of *Cl. welchii* Type D in ileum contents was confirmed in a fair proportion of cases in both groups. In a further series of observations on 1,851 lambs it was found that temporary fasting (penning for eight hours) reduced mortality to a similar extent (inoculated 0·35%, penned 0·48%, controls 2·46%). On one farm, however, losses in the penned group were as heavy as amongst controls.—H. E. HARBOUR.

VIERA, O. (1937). Concentración de la vacuna contra el carbunclo sintomático (La Mancha), por medio del sulfato de sodio. [**Concentration of Blackleg Vaccine with Sodium Sulphate**].—*Rev. Med. vet., B. Aires.* **19.** 396-400.

Five strains of *Clostridium chauvei* were grown in culture broth containing pigeon muscle and glucose. The cultures were formolized, mixed and centrifuged. The liquid was decanted and the sediment (fraction 1) was washed and the bacilli were suspended in physiological saline at a concentration of 500 million per c.c. Anhydrous sodium sulphate was added to, and dissolved in the decanted liquid (fraction 2) in a proportion of 25% and at a temperature of 30-31°C. The resulting precipitate was collected with an equal amount of liquid, and shaken up in a flask with glass beads. The concentration of sodium sulphate in the liquid remaining from fraction 2 was brought up to 55% ; it was dissolved with difficulty, and a second precipitate was collected. This was shaken up with physiological saline and glass beads. The two precipitates and the washed bacteria were then mixed, glycerinated saline was added and also commercial formol in the proportion of 1:1,000.

In experiments carried out, the concentrated vaccine was proved to immunize as effectively as a vaccine of live organisms prepared from two attenuated strains. The vaccine was also used successfully for the prophylactic immunization of farm stock. The doses used were 2 c.c. for cattle and 1 c.c. for sheep, as compared with 5 c.c. and 2 c.c. respectively of unconcentrated vaccine.—S. TORRES.

VAN DER HOEDEN, J. (1939). Klinische les. Een en ander over oorzaak verbreiding van de actinomycose bij mensch en dier. [**Human and Animal Actinomycosis in Holland**].—*Tijdschr. Diergeneesk.* **66.** 53-61. 7 tables.

From figures from a number of hospitals and abattoirs, the author concludes that actinomycosis is not common in Holland. The directors of five large abattoirs reported 1,015 cases of actinomycosis in cattle, 900 times in head or tongue, 61 times in the lungs, 10 times in the udder, 11 times in the abdominal organs, and 32 times in the lymph nodes. Figures are also given for 14 abattoirs relative to various periods of years for cattle, and for five abattoirs for swine. [Interval

covered by figures not given. The above data were evidently based on visual meat inspection, the cases not being investigated bacteriologically.—Ed.]

—Jac. Jansen (Utrecht).

I. Koser, S. A., Chinn, B. D., & Saunders, F. (1938). **Gelatin as a Source of Growth-Promoting Substances for Bacteria.**—*J. Bact.* **36.** 57-65. 2 tables. [9 refs.]

II. Koser, S. A., & Saunders, F. (1938). **Accessory Growth Factors for Bacteria and Related Micro-organisms.**—*Bact. Revs.* **2.** 99-160. 1 table. [Numerous refs.]

I. In the course of studies of the nutritional requirements of some of the more exacting bacteria it was found that the addition of some brands of gelatin *e.g.* Difco, to a simple synthetic medium, had a growth-promoting effect. This effect appears to be similar to that obtained with extracts of spleen, liver or yeast and may be greater in extent; considerably larger quantities, up to 5%, of gelatin are, however, needed to produce a like effect. A purified gelatin prepared for photographic purposes showed little growth promoting effect.

It is suggested that certain commercial brands of gelatin are likely, therefore, to offer a promising source of material for the study of the extraction and purification of the substances needed for the growth of such organisms as streptococci, pneumococci, dysentery bacilli, brucella and other species which fail to develop in the usual synthetic media.

II. The authors review the numerous studies in bacterial nutrition which have been made on the so-called growth-factors, accessory substances, vitamins or growth-activators, substances which in small amount play an important part in the development of certain bacteria and are known to be widely distributed in animal and plant tissues. In many cases the growth substances have not been identified although some progress in their separation has been made. In other cases, however, compounds of known chemical structure are now recognized as the active substances of tissue extracts, *viz.* haemin, *i*-inosetol, thiamin, nicotinic acid and its amide, β-alanine, riboflavine, and pyridine nucleopeptide phosphate (coenzyme or cozymase); all except *i*-inositol are needed in very small amounts. The organisms which are known to require one or more of these compounds are *Haemophilus influenzae* and related organisms, staphylococci, *Corynebacterium diphtheriae*, dysentery bacteria, lactic and propionic acid bacteria, certain protozoa and certain of the true fungi, including some yeasts. By substitution of the usual tissue extracts by the appropriate compounds, it is now possible to grow a number of these organisms in wholly synthetic media. Another substance, biotin, has been obtained in crystalline form as the methyl ester, whilst the " sporogenes vitamin " pantothenic acid and the " L " fraction for lactic acid bacteria have been obtained in a relatively pure state.

Organisms which require the above compounds are apparently unable to synthetize them, whilst there is increasing evidence that other less fastidious types are able to construct them from simpler substances. The various constructive abilities of different organisms are regarded as significant in relation to symbiotic and other mutual relationships. With the exception of *i*-inositol and β-alanine, the accessory factors are known to enter into the structure of enzyme-coenzyme systems which catalyze oxidation processes.

The growth-promoting effect of tissue extracts cannot be explained solely on the basis of alteration in the inorganic salt content or physical properties of the medium. Some significance is attached to the fact that recent work has shown the close relationship between the nutrition and metabolism of micro-organisms and

the higher forms of plant and animal life. In discussion it is suggested that some of the strictest parasites have lost a large part of their constructive ability and may conceivably be unable to put together a necessary organic catalyst even though supplied with its component parts, and need therefore to be given intact preformed components of a whole system.—A. W. Stableforth.

Morton, H. E. (1939). **The Survival of Microorganisms in Fixed and Stained Preparations.**—*Amer. J. clin. Path.* **9.** 68-70. [2 refs.]

Smear preparations of various organisms on sterile cover-slips were fixed by passing them three times through a bunsen flame. They were then dropped into flasks of broth and incubated for a suitable period. Preparations of *Staphylococcus aureus* and *albus*, *Pneumococcus* Type I, *Streptococcus faecalis* and *Mycobacterium phlei* were found to survive this fixation. Certain organisms were found to survive treatment for one minute with basic fuchsin, gentian violet and aqueous safranin and for 15 minutes with Loeffler's methylene blue.—E. C. Hulse.

DISEASES CAUSED BY PROTOZOAN PARASITES

van den Branden. (1939). Influence du froid sur l'évolution de la trypanosomiase expérimentale du rat blanc infecté de Trypanosoma brucei. [**Influence of Cold on the Development of Experimental Trypanosomiasis of White Rats Infected with** *Tryp. brucei*].—*Ann. Soc. belge Méd. trop.* **19.** 243-244. [1 ref.]

The author found that in rats infected with *Tryp. brucei* the incubation period was lengthened when the rats were kept at a temperature of 4-5°C. This appeared to be due to an increased resistance in the rat rather than a reduced virulence of the trypanosomes, since the latter were abundant and active in the blood, and when inoculated into control rats kept at a normal temperature, produced the disease with no lengthening of the developmental period.—M. L. Bingham.

Lwoff, M., & Ceccaldi, J. (1939). Culture *in vitro* d'une souche de *Trypanosoma gambiense* d'isolement ancien. [**Culture** *in vitro* **of an Old Strain of** *Tryp. gambiense*].—*Bull. Soc. Path. exot.* **32.** 721-726. [15 refs.]

The authors describe their method of culturing a strain of *Tryp. gambiense*, maintained for four years in g. pigs. Six successful passages were made, lasting 98 days, after which the series was voluntarily abandoned. The cultures were made on Razgha's (1929) medium, using blood from three different persons. The results showed that the blood of certain individuals was much more favourable than that of others for the multiplication of the trypanosomes *in vitro*. The reason for this was not apparent, but the authors suggest that it is important to utilize blood of known suitability.—M. L. Bingham.

Nieschulz, O., Bos, A., & Frickers, J. (1938). Over een infectie door Trypanosoma viennei bij een rund uit Suriname. [**Infection of Cattle in Surinam with** *Trypanosoma viennei*].—*Tijdschr. Diergeneesk.* **65.** 963-972. [English, French and German summaries]. 4 figs. [7 refs.]

Trypanosoma viennei infection (*Tryp. guyanense*) occurs in cattle in Surinam. The posterior part of the body of the trypanosomes is broadened, the blepharoplast is large and the undulating membrane is only slightly developed. The length of the trypanosome (including the free flagellum) is 21·8μ (limits 17·9-26·4μ). Attempts to infect mice, rats, g. pigs and dogs with *Tryp. viennei* were unsuccessful.

In three of five injected rabbits a slight infection of short duration developed; inoculation from these rabbits into other rabbits had negative results. Two cows, two sheep and three goats were easily infected. One sheep succumbed to the infection after 49 days. The incubation period was 2-5 days. The occurrence of trypanosomes in the peripheral circulation was marked during the first 14 days and then decreased, but the intervals between their reappearance became progressively longer. The temperature was very irregular, with many fever periods, mostly short.

According to present experience it seems that infection with *Tryp. viennei* is mainly of a chronic character.—Jac. Jansen (Utrecht).

van Goidsenhoven, C., & Schoenaers, F. (1939). Infection expérimentale du cheval par *Trypanosoma equiperdum* entretenu sur cobaye. [**Experimental Infection of the Horse with** *Tryp. equiperdum* **Maintained in G. Pigs**].—*Ann. Soc. belge Méd. trop.* **19.** 245-251. 2 tables. [6 refs.]

Observations were made on an aged mare after intravenous inoculation with 2·5 c.c. of g. pig blood infected with *Tryp. equiperdum*. This strain had been maintained in laboratory animals for 25 years, and in g. pigs for the last 17 years. It was found that the virulence of this strain for the horse, far from being attenuated, was actually increased and, unlike natural dourine, the experimental infection was accompanied by the presence of abundant parasites in the peripheral blood. The clinical and pathological symptoms, however, closely resembled those seen in natural infections. A graph and table indicating the differential blood count and number of trypanosomes is appended.—M. L. Bingham.

Swangard, W. M. (1939). **Trichomoniasis in Cattle: Biological Studies and a System of Control.**—*J. Amer. vet. med. Ass.* **95.** 146-151. [9 refs.]

S. discusses the pathology of trichomoniasis, and much of the paper is devoted to treatment of the disease by a travelling clinic of the Munich Veterinary School in Upper Bavaria, 1936-38. Careful examinations of infected animals revealed parasites only in the urogenital tract of females and the sheath of males. A wide variety of symptoms may result either directly from invasion by the parasite, or indirectly from secondary invaders.

Diagnosis was based on the general breeding history and on microscopy where symptoms were confusing or absent. For control purposes, herds were classified as (a) non-infected cows and virgin heifers, to be served by a "clean" bull; (b) pregnant cows, observed for pyometra and believed to be infected; (c) infected animals, given treatment. Pyometra cases were treated by forcible enucleation of the corpus luteum (2% mortality) followed by vaginal douches with 5% sodium perborate, and later, injection of a 1% aqueous iodine solution into the cervix; the latter was omitted when the uterus was not involved. Bulls were treated under spinal anaesthesia by application to the penis of 75-100 c.c. of a 0·5% trypaflavin salve followed by urethral injection of 30 c.c. of 0·1% trypaflavin solution.—M. L. Bingham.

Richardson, F. L. (1939). **Cecectomy of Chicks and Its Effect upon their Growth and Infectibility with Intestinal Flagellates** [*Trichomonas* **and** *Cheilomastix*].—*Amer. J. Hyg.* Sect. C. **30.** 69-71. 1 table. [4 refs.]

R. experienced considerable losses in very young chicks following laparatomy for the removal of the caeca. That the caecum is the normal site of infection of the flagellates in the chickens was confirmed. It was found that, as judged from the weights when nine weeks old, the growth rate in chicks was not affected by

removal of their caeca. The caeca were removed from seven chickens. These flagellates were then fed to them and they were placed in contact with parasitized birds, and they did not become infected.—S. G. Iyer.

Jacob, E. (1939). Die Verbreitung der Rinder-Piroplasmose im Gau Niedersachsen. [**Bovine Piroplasmosis in Lower Saxony**].—*Z. InfektKr. Haustiere.* **55.** 117-133. 1 table, 1 map. [Numerous refs.]

An investigation into the distribution of bovine piroplasmosis in Lower Saxony due to *B. bovis* is described, information as to the existence of the disease in each area having been obtained from the veterinary practitioners. The nature of the disease, the method of its introduction into a new area and the methods of diagnosis are discussed. It is pointed out that, although clinical diagnosis is relatively reliable, it is not always easy to detect the parasites microscopically, as they are often scantily present in the peripheral blood. Recovery after treatment with "acaprin" can, however, be accepted as evidence that the redwater was due to piroplasms.

Interesting notes are given on the disappearance of the disease from various areas, and it is suggested that tick life is favoured by damp conditions and by bush, and instances are quoted of areas in which drainage and bush clearing have resulted in its disappearance. On the other hand other areas are mentioned in which the disease has disappeared without noticeable alterations in conditions, except for a slight increase in cultivation. In one area the disease disappeared 20 years ago and has not recurred.

Discussing control measures, J. considers that tick destruction by abandonment of pasture or by dipping is impracticable. Slaughter of affected animals is not successful as it does not free pastures from infected ticks. He advocates treatment of affected animals and incontacts with "acaprin" or trypanblue, and re-treatment of any animals suspected of relapse or residual infections. [Treatment with these drugs is usually accepted as causing clinical recovery, but not destruction of the parasites]. He also advocates draining and bush clearing, a period of quarantine for cattle coming from infected pastures, and the cultivation or grazing of sheep on such pastures. He was unable to obtain any evidence that movements of wild game might lead to spread of the disease.—U. F. Richardson.

Lavrent'ev, P. A. (1938). K voprosu klinicheskoi diferentsial'noi diagnostiki piroplazmozov krupnovo rogatovo skota. [**Clinical Differentiation Diagnosis of Piroplasmosis and Theileriasis in Cattle**].—*Trud. Uzbek. nauchn.-issled. vet. Stan., Tashkent.* **10.** 54-58. [4 refs.] [English summary].

The present facilities for bacterial examination in Uzbekistan are such as to cause delay in microscopic differential diagnosis of babesia, theileria, and françaiella infection in cattle, when preparations have to be sent to a laboratory for diagnosis. Therapeutic measures are rendered useless by this delay. In view of this, L. attempted the differentiation of the three conditions by clinical characteristics only. Haemoglobinuria (dark cherry colour of the urine during the first few days, or chocolate colour at later stages) is evidence for babesia infection. Absence of haemoglobinuria, with coughing, enlarged lymph nodes, bloodshot eyes and cutaneous haemorrhages, denotes theileriasis. Absence of haemoglobinuria, or its appearance at the final stage of the disease with less intensive coloration and the presence of punctiform haemorrhages on the mucous membranes, indicates françaiella infection.—E. Martin.

Bogoroditskiĭ, A. V. (1938). Znachenie pomeshcheniĭ v dele profilaktiki theilerioza krupnovo rogatovo skota. [**The Importance of Byre Hygiene in the Control of Bovine Theileriasis**].—*Trud. Uzbek. nauchn.-issled. vet. Stan., Tashkent.* **10.** 48-53. 1 chart. [5 refs.] [English summary].

To protect imported cattle against theileriasis, B. recommends the use of new byres, or of byres in which animals other than cattle have been kept within the period of the life-cycle of the vectors.

Byres should be so designed as to prevent access of ticks to the cattle, employing the usual procedure and maintaining the usual precautions to avoid the provision of hiding places for ticks.—E. Martin.

Orinsbee, R. A. (1939). **Field Studies on Coccidiosis in the Ring-Neck Pheasants of Eastern Washington.**—*Parasitology.* **31.** 389-399. 13 figs. on 1 plate, 2 tables. [Numerous refs.]

Observations are recorded on the distribution, histopathology, general morphology and biology of the three established, and one possibly new, species of *Eimeria*, occurring in the hybrid Chinese pheasants of Whitman County. In the infected birds examined only slight damage was observed, and the weight of these birds differed little from those of uninfected ones. The incidence over seven months averaged 38% and was calculated on the results of the examinations of 37 birds. Variations in incidence occurred at different times: there was a swing from 70% in October to 30% in November. An incidence of 30% was observed through February and March and a rise to 67% was noted in April. The species studied were *E. phasiani*, *E. pacifica* and *E. megalostomata*. [The most usual medium for preserving stock cultures of oocysts is a 2·5% solution of potassium bichromate but O. has found that better results are obtained for the above species with one of 2%. The paper contains some interesting information concerning the effect of temperature on development].—C. Horton Smith.

Ristorcelli, M. (1939). Essais d'infestation expérimentale du chat par *Entamoeba coli*, par la voie intestinale haute, après laparotomie. [**Experimental Infection of Cats with *E. coli*, by way of the Small Intestine, after Laparotomy**].—*Bull. Soc. Path. exot.* **32.** 597-599. [2 refs.]

Attempts to infect 20 cats with *Entamoeba coli*, by inoculation into the ileum after laparotomy, met with negative results, except in one doubtful case in which small vegetative forms (12-15μ) of *Entamoeba* occurred associated with slight colitis.—M. L. Bingham.

Nicolau, S., & Ravelo, A. (1937). La réaction de fixation du complément dans le sérum et dans des extraits d'organes d'animaux atteints de toxoplasmose expérimentale. [**Complement-Fixation Reaction in Experimental Toxoplasma Infection**].—*Bull. Soc. Path. exot.* **30.** 855-859. [2 refs.]

A methyl alcohol-extracted antigen was prepared from dried and powdered parasitized spleens of rabbits dead of toxoplasmosis. Reactions to the complement-fixation test, considered to be specific, were obtained with serum or organ extracts of experimentally infected rabbits, g. pigs, pigeons, cats, dogs and monkeys. Positive reaction was apparently due to the presence in the tissues of specific antibodies, but it was found that negative results were not significant. With serum derived from infected animals 58·8% positive results were obtained. 106 extracts of various organs were tested; of these, brain extracts gave 90% positive reactions; extracts of other organs (*i.e.* lung, spinal cord, adrenal gland, muscle, spleen, etc.) were seldom positive.—M. L. Bingham.

HUFF, C. G. (1938). **Studies on the Evolution of Some Disease-Producing Organisms [Rickettsiae, Spirochaetes and Protozoa].**—*Quart. Rev. Biol.* **13.** 196-206. [Numerous refs.]

Unlike plants and animals, pathogenic organisms have left no traceable fossils, and even if these were available it is unlikely that they would convey much about the evolution of these organisms. H. therefore approached the question by studying the relationship between parasite, host and vector. All the organisms studied are transmitted by arthropods and none of them are free-living in any stage.

Evidence favours the belief that the rickettsiae are primarily parasites of arthropods, and secondarily of vertebrates. Most of them are so well adapted to the arthropod host that they no longer produce disease in it, and this adaptation is, in certain instances, so specialized that they are able to pass from the infected female into the egg and so to the next generation of arthropods.

It seems that rickettsiae may have been associated with mites for long periods of geological time, even before the mites assumed a parasitic mode of life. When rodents became parasitized by mites the rickettsiae probably caused great losses in the rodents, but through time the organisms became better adapted to these more recent hosts. *Rickettsia prowazeki*, the cause of human typhus, destroys the tissues of the louse which transmits it and is not passed on to the next generation of lice *via* the egg, both of which facts point to the comparatively recent parasitism of lice by this organism.

Spirochaetes too seem to be primarily parasites of ticks, as they can be transmitted *via* the egg to another generation of ticks. This does not occur in the louse, thus indicating a more recent relationship between spirochaete and louse than between spirochaete and tick.

Piroplasms which are always transmitted by Ixodid ticks, although the final hosts are very varied, were probably first of all parasites only of the ticks.

Similarly H. believes that the evolution of the malaria parasites has been parallel to that of their hosts ; the mosquitoes were infected before the vertebrate hosts. An example of this is seen in the transmission of species of *Plasmodium* in primates by anopheline mosquitoes whereas in birds transmission is by culicine mosquitoes, which is to be expected if the malaria parasites were originally parasites of mosquitoes.

A plea is made for the development of this branch of science.—A. L. WILSON.

WALCH-SORGDRAGER, B. (1939). **Leptospirosis.**—*Bull. Hlth Org. L.o.N.* **8.** 143-386. 49 tables. [Numerous refs.]

This review of leptospirosis is mainly concerned with human infection and the epidemiology of the various forms of the disease in man. In addition to man, natural infection with leptospira occurs in rats, field mice, dogs, cats and foxes. KLARENBEEK has recorded infection in a young pig, and one case is on record of a butcher who had developed infection after cutting up a jaundiced pig. Foals are easily infected by inoculation, and the serum of most horses contains agglutinins.

A large number of different species of human leptospira have been described, all morphologically similar, but differing from each other immunologically and distinguishable from each other by agglutination tests. Whilst sera of animals infected with one species may give agglutination with a related species, they always give agglutination at a higher dilution with the homologous organism. The various human diseases can be divided into three main types :– (a) " Mud Fever ", caused by *L. grippotyphosus* and other similar organisms, occurring in agricultural populations working in swampy flooded areas, but sometimes occurring in the absence of swamp conditions. This infection is rarely, if ever, fatal in man and

the organism has no virulence for g. pigs. It has been suggested that water leptospira may under certain circumstances acquire virulence, that field mice may act as the reservoir host, or that man may be the principal carrier. (b) *L. canicola* infection which has been described in Holland and San Francisco. The causal organism is a parasite of dogs, is not transmissible to rats, and has little virulence for g. pigs. Infection is rarely fatal in man and rarely causes jaundice. The organism is held to be responsible for Stuttgart dog disease which is characterized by azotemic uraemia and nephritis. The disease is said to cause a high mortality in dogs, but carrier animals have been encountered which had no history of clinical disease. Male dogs are more frequently affected than females, this being ascribed to their habit of sniffing at urine. (c) *L. icterohaemorrhagiae* infection (Weil's disease), a widely spread condition associated with bathing in, or handling, water contaminated by the urine of rats. The organism is virulent for g. pigs and may cause a mortality of 15% in man. Dogs are also susceptible, developing symptoms similar to those in man—fever, muscular pain, injection of the conjunctiva, herpes, haemorrhages and usually jaundice.

For detection of infection the author recommends the examination of kidney material by dark ground illumination and, if leptospira are detected, the sub-inoculation of a g. pig. The leptospira in the kidneys are confined to the convoluted tubules of the renal cortex and lie in the lumen of the tubules on the epithelium. The examination of urine does not give such satisfactory results as the examination of kidney material. Cultivation from the renal cortex is a valuable diagnostic method, but ten days or more are required before cultures develop. Animal inoculation is the least reliable method of detecting infection. Serological tests are valuable but the suspect serum has to be tested against several strains of *L.i.* and *L.c.*

For prevention, the usual methods of rat control are recommended, and it is considered that the voided urine of recovered men or dogs should be treated with disinfectants for several months. Immunization with heat-killed or carbolized vaccines has seemed of some value. Treatment with bismuth compounds has given encouraging results experimentally, and anti-serum, if given early and repeated whenever symptoms recur, appears to have considerable value.—U. F. Richardson.

DISEASES CAUSED BY VIRUSES

Vianello, G. (1939). L'immunizzazione attiva contro l'afta epizootica con un vaccino avirulento all'anisolo. [**Immunization against Foot and Mouth Disease by an Avirulent Anisol Vaccine**].—*Clin. vet., Milano.* **62.** 585-613. 6 figs. [Numerous refs.] [German summary].

A report of research carried out at the veterinary experimental station, Milan, on the use of essences and essential oils in the preparation of F & M disease vaccine. The following substances were tested: cineol, safrol, geraniol, citral, anethol, carvone, fenchone, anisaldehyde, citronellal, heliotropin, menthol, terpineol, terpinol, anisol, pulegone, carvene, benzaldehyde, eugenol, amyl alcohol, cinnamaldehyde, amyl acetate, cinnamic acid, terpine hydrate, thymol, methylsalicylate, carbon tetrachloride. Anisol (methoxy-benzene, C_7H_8O) was finally selected as a substance possessing a suitable degree of bactericidal and virucidal power. A concentration of 0·25% was found to kill F & M disease virus in 4-5 days at room temperature, but for the purpose of vaccine production a 0·25-0·3% concentration was allowed to act on the virus for 6 days at 32°C.

Two kinds of anisol vaccine were made—an aqueous suspension of epithelium from the vesicles and an aluminium hydroxide adsorbate. When tested by subcutaneous injection on g. pigs, both kinds were innocuous. When g. pigs were infected in order to test their immunity 18, 22, and 44 days after inoculation, vesicles developed, ranging from " hardly perceptible " to " medium ", but there was no generalization, while in control animals there was generalization. Vaccine preserved at +1°-+2°C., for 3 months lost none of its protective power. In comparative tests of the immunity conferred by vaccines prepared with chloroform and formol, there was generalization in 75-100% of the animals.

Thirty-five bovines were inoculated with the anisol (aqueous suspension) vaccine and, at the time of writing, that is nine months after inoculation, none of these animals had contracted the disease. This kind of vaccine was abandoned later in favour of an $Al(OH)_3$-adsorbed vaccine, prepared on the lines of the Riems vaccine. Finding, however, that the usual asbestos filter caused too great a loss of virus (60-90%), V. filtered the epithelial suspension through close-woven cloth, such as is used in Italy in making wine, and claims that this method offers great advantages over the method used for the Riems vaccine.

23 susceptible bovines, vaccinated with 4 different lots of $Al(OH)_3$-adsorbed vaccine, and, after a lapse of 10-18 days, subjected to infection by close contact with affected animals and by direct application of virus to the gums and nose, remained healthy, while controls sickened with typical lesions in the mouth and interungual spaces. It is stated that in comparable experiments there was a 10-40% F. & M. morbidity with the Riems vaccine, as compared with 100% immunity with the anisol adsorbate vaccine.

703 bovines were vaccinated with anisol without any adverse effect.—E. M.

Philippe, J., & Sissoko, M. (1939). Action de la bile normale sur le virus pestique. [**Action of Normal Bile on Rinderpest Virus**].—*Bull. Serv. zootech. Epiz. A.O.F.* **11.** No. 3. 4-7.

Following the experiments of Curasson and Mornet [*V. B.* **9.** 622.], the authors tested virus-bile vaccines of varying constitution. Results suggested that the bile killed, but did not attenuate virus, and that the proportion of virus killed depended simply upon the dilution of the bile and the time of contact. A mixture of virulent spleen—2 g. in 20 c.c. saline with 20 c.c. bile, kept in contact for six hours—conferred immunity in a few cases in doses of 2 c.c. and 5 c.c. Larger doses were infective, as were mixtures made with smaller proportions of bile or shorter contact times. If virulent blood was substituted for spleen, or if 1 c.c. doses were used, there was no reaction, and test animals remained susceptible. Results were inconstant, and the margin between vaccinating and infective doses was too small to allow of practical use of the method.—H. E. Harbour.

I. Jacotot, H. (1939). Sur la transmissibilité de la peste porcine à diverses espèces animales. [**Transmissibility of Swine Fever to Various Species of Animals**].—*Ann. Inst. Pasteur.* **62.** 516-533.

II. Zichis, J. (1939). **Studies on Hog-Cholera Virus.**—*J. Amer. vet. med. Ass.* **95.** 272-277. 2 tables. [5 refs.]

I. J. concludes from an extensive series of experiments [for earlier notes see *V. B.* **7.** 277, **8.** 288.] that swine fever is transmissible to many species other than swine. In most cases however, no symptoms were noted or at most some pyrexia and slight indisposition.

The first part of the article refers to subcutaneous experiments. The general plan of these was to inoculate the test animal at several points with a relatively

large volume (10-30 c.c. for the larger animals and 2-4 c.c. for dogs, cats, g. pigs, etc.) of defibrinated blood from a pig which had been injected five days earlier; to take blood from this test animal (usually about 20 c.c. from the jugular vein, but in some positive experiments 3 c.c. or so) 3-5 days later or, in most cases several times, at intervals of a few days, and to inject this immediately into one or two young pigs to test for the presence of virus. If the result was positive it was confirmed by passage to another pig. If it was negative the pig was later injected with known infective blood. Bacterial contamination was guarded against by microscopic and cultural tests. And in order to be assured that the test pigs were in fact dying of swine fever, immunized pigs were also used " where deemed necessary ".

Positive results were always obtained in sheep and goats and in a smaller number of calves, cats and monkeys; they were usually obtained in horses and cattle; they were rarely obtained in the dog or civet, only once in a pigeon and not in Indochinese rabbits or g. pigs or, according to the author's conclusions, in Peruvian g. pigs. [In his test however he records positive transmission in these g. pigs.]

Positive results were also obtained in sheep and goats by the intratesticular, intracerebral and oral routes and by contact, the general plan of experiment being the same except that the doses of virus blood were relatively smaller for the intratesticular (2-3 c.c.) and intracerebral routes (0·25 c.c.).

Serial passage was also successful in both sheep and goats, three methods being used *viz*, brain to brain (the site of inoculation being avoided when collecting material for the next passage), blood to testicle, and blood to subcutaneous tissue. The intracerebral and intratesticular methods were successfully carried to five passages and virus was recovered at the last; the subcutaneous were carried to several passages.

Virus was also found in the milk and urine of goats and sheep 3-5 days or more after injection.

In a few cases a goat or sheep was bled at intervals of three days over a period of several weeks and the blood injected into a separate pig on each occasion. It was found that virus might be detected up to 18 or 36 days after inoculation, but that it might not be detected at some of the earlier bleedings of the same animal. The amount of virus present in the blood of animals other than the pig is believed to be much less than in pigs.

Sheep, goats and calves appeared to be rendered resistant by one injection of virulent blood. Horses and cattle, however, when reinjected, often carried the virus for some time. Although a few of the test pigs took an unusually long time before developing swine fever, most infected pigs first showed symptoms at 36 hours to 3½ days and died within 6-23 days (usually 8-15 days).

[The experiments described are of great importance as regards the methods of spread and control of swine fever. The passage experiments of JACOTOT, particularly those in which virus was recovered after five " blood to testicle " passages and after several blood and subcutaneous tissue passages, imply a dilution of the original material which precludes the possibility of survival alone being responsible. The fact that goats, sheep and calves appeared to resist a second attempt to infect them also supports the view that infection was not merely passive. Most of the experiments in which the virus was recovered after injection by various routes, feeding or contact are, however, open to some criticism, since one pig was used for each sheep, goat, etc. and injected with blood taken either at 4 or 5 days or with several lots of blood taken at *e.g.* 3, 6 and 9 days respectively. Mere survival of virus might in these cases account for the infection of the test pig. Survival

would not, however, appear to account for recovery of the virus after 18 or 36 days, as was done in some cases. The regularity of the incubation periods and time to death would appear to make it unlikely that extraneous infection interfered with the results.

The experiments of ZICHIS give strong confirmation to those of JACOTOT, the passage experiments again being the most significant. It should be added (without in any way reflecting on the precautions taken by JACOTOT) that Z., realizing the extreme ease with which swine fever may be spread, gives details indicating that considerable care was taken to avoid the possibility of extraneous cross-infection. On the whole, therefore, these authors appear to have produced considerable evidence to support their conclusions that swine fever virus may be carried by and multiply in animals other than swine].

II. Z. concludes from his experiments that swine fever infection can be transmitted from pig to sheep by intravenous inoculation or cohabitation and *vice versa*, and that although the virus produces no symptoms in sheep their blood remains pathogenic for pigs for at least 21 days. He concludes further that the virus may be passaged in sheep at least ten times.

A sheep was injected with virus and three days later two other sheep were penned with the injected sheep. Seven days later they were removed and placed in contact with a pig. This pig developed typical swine fever. In a second experiment a pig was injected with the same virus used in the first experiment and three days later two sheep were placed in the same pen. They were removed seven days later and placed in contact with a normal pig. The pig remained healthy. Another pig, however, which was injected with 1 c.c. of blood from each of the two sheep, died of swine fever.

Passage experiments.—A sheep was inoculated intravenously with 2 c.c. of virus blood. Seven days later 2 c.c. of blood from this sheep was injected into a second sheep and this procedure continued for a series of passages. Pigs were inoculated after one, two and ten passages and all died after showing typical symptoms of swine fever; the dose for the last two pigs was 0·00001 c.c. of the sheep's blood. The pig inoculated at the eleventh passage did not become infected. The virus from the tenth sheep was however successfully passaged further through other sheep. None of the sheep showed any symptoms.

Blood taken from a calf three days after injection with 5 c.c. of virus blood was infective to swine. Blood taken at 14 days was not.

It was not found possible to produce anti-swine-fever serum in a calf or a sheep by hyperimmunization with virus blood from calves, sheep or pigs or to demonstrate any protective properties in blood from virus-inoculated sheep, whose blood had become non-infective to swine. Sheep blood virus was used successfully with commercial antiserum in the serum simultaneous inoculation of swine.—A. W. STABLEFORTH.

VECHIU, A. (1939). Sur la transmission de la peste porcine à d'autres espèces animales. [**The Transmission of Swine Fever to Other Animal Species**]. —*Bull. Off. internat. Epiz.* **18.** 167-209. 22 figs., 10 tables. Discussion pp. 478-482.

V. draws the following conclusions from an extensive series of experiments. Swine fever may be transmitted to rabbits by combined intracranial and intraocular inoculation of brain, cerebrospinal fluid or blood from a high proportion of infected pigs, and the infection may be transmitted in series over a large number of generations. It appears that success was regularly attained with eight strains and with material from pigs which died within seven days, but not with pigs which

died later. After an incubation period varying greatly (1-200 or 300 days) according to the strain and passage, the rabbits showed a febrile condition, usually fatal, and accompanied by enteritis, nasal discharge, nervous symptoms, marked blood changes and sometimes chronic cachexia. The illness usually lasted from a few hours to two and a half weeks. In the subacute forms the blood changes consisted of a leucopenia with slight alteration of the differential count, or leucocytosis with increase of pseudo-eosinophiles; whilst in chronic forms a monocytosis was followed by an increase of pseudo-eosinophiles. Certain rabbits showed lesions like those found in pigs, *e.g.* infarcts, oedema or broncho-pneumonia, haemorrhages in the mesenteric glands, kidney, and bladder and necrotic lesions in the intestine. The more virulent strains killed within 24 hours. The virulence of the same strain varied at different times. One strain (" Behringswerke "), derived from brain, showed a facility for adaptation to the brain of the rabbit greater than the same virus from the blood of the pig.

It is claimed that regular passage in the rabbit's brain produced an adaptation for the central nervous system and an increase of virulence, marked by shortening of the incubation period and intensification of the nervous symptoms.

Whilst lymphatic gland virus possessed an affinity and virulence for the brain of other rabbits similar to those of brain virus, serum or blood virus from the same rabbit was of lower virulence. Inoculation of brain-passaged virus by the subcutaneous, intradermal, intraperitoneal, corneal, or intramuscular routes was followed by symptoms and lesions like those which followed intracranial or intraocular inoculation.

It is also stated that g. pigs are susceptible to rabbit-passaged virus and show somewhat similar symptoms, whilst sheep are less susceptible, some succumbing, others suffering a benign or symptomless infection. Virulent strains keep their virulence intact during passage in laboratory animals, whilst less virulent strains are attenuated and may be difficult to revive.

It was also found that the porcine virus keeps well for 30 days in glycerine in the cold but from then until after about 45 days gives inconstant results in tests of virulence. It was found that it passes freely through a Seitz or Chamberland L2 filter.

Details of vaccination experiments on pigs with rabbit brain virus are promised in the near future.

[It is not possible to deal here with the evidence adduced in support of the author's conclusions and those interested should consult the original].—A. W. S.

HARE, R. (1939). **The Effect of Passive Immunisation on Experimental Virus Influenza in Mice.**—*J. Path. Bact.* **49.** 411-428. 8 tables. [16 refs.]

Various strains of influenza virus, including P.R.8, W.S., Kerr, and Gatenby, were titrated against different batches of sera prepared against the P.R.8 strain, using a passive immunity test in mice.

It was found that convalescent ferret or immune horse sera, injected intraperitoneally up to 72 hours after infection, gave some protection against virus instilled intranasally. The best results were obtained with ferret serum and the homogenous virus, but some protection was afforded against heterologous strains. The horse serum was less effective, but the antibody content could be increased by concentration of the globulin with ammonium sulphate or sodium sulphate. Rabbit sera, on the other hand, were very poor.

The clinical application of serum therapy is discussed.—R. E. GLOVER.

ROBERTS, S. J., & MOORE, G. R. (1939). **Report on Equine Enzootic Encephalomyelitis at the Kansas State Veterinary College Clinic.**—*Cornell Vet.* **29.** 270-278. 1 table.

An account is given of 151 cases of the western type of equine encephalomyelitis during the summer of 1938. The disease appeared first at the end of May, persisted till the end of September, and resulted in the death of 35% of affected horses. All ages, classes and conditions of horses at grass were affected. Horses in stables, however, appeared to be immune. The symptoms varied from mild to severe. In many cases the animals were merely lethargic. In others the onset was rapid and pronounced symptoms appeared in 6-24 hours. The temperature ranged initially from 103°-107°F., and a characteristic sleepy attitude was adopted. Symptoms of psychic derangement, motor irritation and paralysis followed, and weight was lost rapidly. The usual course was from 2-8 days. Treatment was essentially symptomatic ; mild cases recovered without difficulty. If used early enough 250 c.c. of specific serum had curative effects. Once the central nervous system was affected, however, serum was of little or no value. Sulphanilamide in daily doses of 180-240 grains (11·7-15·5 g.) apparently accelerated the rate of recovery of badly affected cases, and glucose-saline was administered intravenously and by stomach tube as a routine to counter the effects of dehydration.

For prophylaxis, chick-embryo vaccine was effective. No cases of encephalitis occurred in 126 horses which were vaccinated before and during the epidemic.
—D. D. OGILVIE.

BEAUDETTE, F. R., & HUDSON, C. B. (1939). **The Viability and Immunizing Value of Egg-Propagated Laryngotracheitis Virus.**—*J. Amer. vet. med. Ass.* **95.** 333-339. 4 tables. [10 refs.]

Tenth passage egg virus remained viable for 421 days, when dried and kept *in vacuo* in the refrigerator. At the 25th generation, while the immunizing value of the virus was not impaired, certain inconsistent results were obtained with smaller doses. In a trial under field conditions the egg-passaged virus gave a high percentage of " takes ".

Detailed results of egg passages to the 25th generation are tabulated.—S. G. I.

BLAND, J. O. W., & ROBINOW, C. F. (1939). **The Inclusion Bodies of Vaccinia and their Relationship to the Elementary Bodies Studied in Cultures of the Rabbit's Cornea.**—*J. Path. Bact.* **48.** 381-403. 21 figs. on 4 plates, 2 tables, 1 appendix. [Numerous refs.]

Cultures of rabbit cornea were grown as hanging-drop preparations until a sheet of epithelium had formed. The cells were then infected with concentrated suspensions of washed vaccinia elementary bodies, stained with Giemsa, and examined at spaced intervals. Counts were made of the number of granules and of the varying types of inclusion bodies.

The earliest inclusions were small homogeneous bodies, appearing during the first two hours ; these were succeeded by large homogeneous bodies. Later, small and large networks were seen, which stained less densely than the homogeneous bodies. In the initial stages, when the latter were at their maximum, E.B's were seen in many cells, but during the middle period of infection they tended to disappear, reappearing with the formation of the large networks.

B. and R. postulate a cycle of development in which E.B's entering the cytoplasm become enlarged and more readily stainable. Subsequent changes in the appearance of the bodies result from growth, coalescence and rarefaction. The evidence advanced supports the theory of von Prowazek, and the retention of his

name, *Chlamydozoa*, for this type of virus is advocated. Other theories are also discussed.—R. E. Glover.

Lee, C. D., & Wilcke, H. L. (1939). **Fowl Leukosis. IV. Symptoms and Pathology. V. Transmission Experiments.**—*Poult. Sci.* **18.** 224-249 and 250-254. [1 ref.]

The authors include under this term what they believe to be three related types of disease—erythroleucosis, myeloid leucosis and lymphoid leucosis, and they consider that the types may be so intermingled that there arises a complex disease syndrome which has been called fowl leucosis. The causal agent is believed to be a virus.

The most prominent symptoms associated with each type of leucosis are described, and in so doing the authors find it necessary to make a further additional classification on clinical grounds.

The common symptoms of the erythroid type are anaemia, icterus and emaciation; the flesh may be oedematous and soft. Haemocytoblasts and basophile erythrocytes may be present in the circulation, although a normal blood picture does not mean that the bird is not suffering from this type of disease.

Myeloid leucosis is characterized by the presence in the circulating blood of myelocytes and haemocytoblasts. The onset may be gradual or rapid, with general weakness and diarrhoea. Lameness may be present with a tendency towards rapid emaciation.

Lymphoid leucosis may be identified with neurolymphomatosis cases in which the prominent or only lesion is an infiltration of the iris with haemocytoblasts and immature lymphocytes. Finally, the symptoms are described of a form of the disease in which tumours, having the characteristics of haemocytomata and lymphocytomata, occur in various organs. The symptoms seen vary with the situation of the tumour; lameness may be present as a result of pressure on a nerve or nerve plexus. Diarrhoea and emaciation may be present in this type of the disease. Gross enlargement, with haemorrhage from the liver, may give rise to symptoms or to sudden death. Dyspnoea may result from lymphocytic infiltrations in the lungs.

In describing the pathology of fowl leucosis, the authors briefly describe in turn the appearance and histology of affected nerves, spinal cord, and brain, and the tumours seen in various organs and the lesions met with in the eye.

An explanation is offered for the absence of blood changes in certain phases of the disease based upon the involvement or non-involvement of the bone-marrow.

The experimental birds used in the experiments described in Part V were derived from two strains whose pedigrees were known; they comprised a susceptible and a resistant strain of White Leghorns.

Numbers of one-week-old chicks from each strain were inoculated intraperitoneally, using different inocula—ovarian tumour from one bird, enlarged nerves from a second, and enlarged liver from a third—and chicks of the same age and from the same strain were placed in contact with them during the course of the whole experiment.

In further experiments, young chicks, presumably from the susceptible strain, were inoculated with a suspension from the above ovarian tumour filtered through a Berkefeld 3N filter, and others were placed in a house in which the litter, used in previous fowl leucosis transmission experiments, had been allowed to accumulate over a period of two years. In these experiments the percentage incidence in the inoculated and contact birds of the susceptible group was high in each case, with a range of 25-90% and a mean in the region of 50%. The higher incidence was

seen in the inoculated birds. The average percentage incidence in the inoculated birds of the resistant strain was 30% and in the in-contacts of this strain 15%. 42% of the birds inoculated with cell-free suspension of ovarian tumour showed evidence of the disease, as also did 25% of the birds kept in contact with them. 50% of the birds kept in the contaminated house contracted fowl leucosis. In all groups the disease in its lymphoid, erythroid and myeloid forms was encountered in roughly equal numbers. The incubation period of the disease appeared longer in those birds inoculated with cell-free filtrate.

Adequate numbers of healthy contacts were kept and only two cases of the disease occurred among them. Some general statements of the result of work on commercial flocks is given, where rigorous culling, sanitation, and breeding from apparently resistant 2-year-old birds reduced the incidence from 25% to 1%.

—L. E. Hughes.

Engelbreth-Holm, J. (1938). **Tumour-Producing Viruses in Fowls.**—*Acta path. microbiol. scand.* Suppl. No. 38. pp. 26-36. [In English].

A valuable address concerning the essential researches upon which the modern concepts of the nature of tumour viruses are based. A number of hypotheses on the chemical composition of the virus have been made. It has been suggested that the tumour-producing viruses may perhaps be placed in a transitional stage between " living " and " lifeless " matter. [In an essay in " *Perspectives in Biochemistry* "—*V. B.* **8.** 331.—Pirie suggested that the expressions " living " and " lifeless " should be replaced by some method of assessing degrees of " aliveness " parallel to the use of pH figures for expressing an acid or alkaline state]. Attention has been drawn to the fundamental fact that the propagation of the tumour-producing viruses can only occur in the living cell in which they are found. The author also discusses the complicated relation existing between the tumour viruses and the protein of normal fowl tissues.—S. G. Iyer.

I. van den Berghe, L., & d'Ursel, F. (1939). Culture en tissus du virus de l'érythroblastose de la poule (souche O.G.) [**Tissue Culture of Avian Erythroblastosis Virus (Strain O.G.)**].—*C. R. Soc. Biol. Paris.* **131.** 1301-1302. [2 refs.].

II. van den Berghe, L., & d'Ursel, F. (1939). Erythroblastose du poussin éclos après inoculation chorio-allantoïdienne du virus (souche O.G.) [**Erythroblastosis of Hatched Chicks after Inoculation of the Allantochorion (Strain O.G.)**].—*Ibid.* 1302-1304. 1 fig. [3 refs.]

I. The authors describe the cultivation of strain O.G. of avian erythroblastosis. A hen, inoculated (intramusc.) with 5 c.c. of supernatant fluid of the fifth subculture showed erythroblastosis in its blood after four days and died of subacute erythroblastosis in 64 days. Similar results were obtained with the 11th passage.

II. The inoculum was introduced into the allantochorion through a small puncture (not a window) to provide more normal conditions for hatching. No histological alterations were found in the allantochorion in eggs so inoculated. A resumé of the symptoms shown by chicks from the time of hatching is given, these being infected with material from the first to the fourth egg passage of virus from several cases of erythroblastosis in cocks and pullets. In five out of six chicks which hatched from such inoculated eggs, paralysis of the feet appeared, from the time of hatching up to four days later, with death in from 8-12 days. The blood and liver of two of the five chicks were infective for hens. These findings, together with others cited, are considered to suggest that leucosis, erythroblastosis,

paralysis and tumour formation of virus origin in common poultry may be the result of a single virus.—C. V. Watkins.

PARASITES IN RELATION TO DISEASE [GENERAL]

Skryabin, K. I., Petrov, A. M., Orlov, I. V., Markov, A. A., Tsaprun, A. A., & Salyaev, V. A. (1938). Kratkiĭ kurs parasitologiĭ domashnykh zhivotnykh. [**Parasitology of Domestic Animals**]. pp. 351. 117 figs. Moscow: Sel'khozgiz. [8vo] [4s.]

This book, containing 350 pages, is the 4th edition of a textbook first published in 1934 for the use of students at veterinary colleges in the U.S.S.R.

A general introduction defines the subject matter of parasitology, enumerates its various branches and gives an appreciation of its significance for the economic and hygienic life of the country.

An initial chapter discussing the biological foundations of parasitology is followed by sections on protozoology, arachno-entomology and helminthology, with the aetiology, geographical incidence, economic importance, epizootology, pathology, diagnosis, therapeutics, prevention and control of the diseases caused by or transmitted by parasites.

The treatment is mainly practical and space is devoted to the description of clinical symptoms and measures of cure and prevention of diseases rather than to the morphology of parasites themselves.

A noteworthy feature of the book is the special attention given to parasites and diseases of animals, such as camels and reindeer, generally little mentioned in elementary text-books.

The style is simple and lucid and the book is without a doubt a useful addition to the didactic literature of parasitology.—E. Martin.

PARASITES IN RELATION TO DISEASE [ARTHROPODS]

Hendrick, J., & Moore, W. (1939). **The Chemical Control of Insect Pests of Animals.**—*Trans. Highl. agric. Soc. Scot.* **51.** 58-74. [19 refs.]

The first part of this paper gives a list of the chief insect pests of livestock in Britain, together with biological notes on each pest and a summary of its economic importance. The second part deals with problems of chemical control and describes suitable insecticides, livestock sprays, dusts, washes and smears. The most suitable stock spray tested, consisted of 0·1% pyrethrins dissolved in water-white mineral oil having a viscosity of 40-55 degrees Redwood No. 1 at 100°F. When 1½ oz. of this mixture was sprayed evenly over milch cows, no harmful effects were observed and about 24 hours protection against fly attack was obtained. The spray must be applied in the form of a fine mist so that the animal is wetted evenly and no visible droplets fall to the ground when the sprayer is held three feet from the animal. A smear for dressing pigs to kill lice and improve the appearance of the skin consisted of 80 parts water-white mineral oil, having a viscosity of 130 degrees Redwood No. 1 at 70°F. and 98% purity, 10 parts crude brown wool grease, 10 parts *Oleum picis* (rect) and 0·05 parts pyrethrins.

Hobson, R. P. (1938). **Sheep Blowfly Investigations. VII. Observations on the Development of Eggs and Oviposition in the Sheep Blowfly** *Lucilia sericata* **Mg.**—*Ann. appl. Biol.* **25.** 573-582. 4 tables. [11 refs.] [For previous parts, see *V.B.* **6.** 140, **7.** 280 and **8.** 246, 442].

Newly emerged *L. sericata* flies fed on meat, sugar and water required from

two days at 37°C. to 13 days at 15°C. for the maturation of their ovaries. Two meat meals were necessary for the development of mature eggs, and at least two meals between successive ovipositions, which occurred at intervals of 1-6 days, according to temperature. The importance of carrion in the maintenance of a fecund population of flies is thus revealed. Since these flies do not usually oviposit on carrion, it is suggested that for this species carrion usually serves more as a source of food than as a focus for oviposition, gravid females being attracted to a greater extent by live sheep.

Animal excreta, plant materials, milk or blood serum failed to replace meat, but egg development occurred when blood serum supplemented by marmite was used for food.

In gravid females, oviposition occurred on various putrefactive products, and also on suint, but occasionally also in response to tactile stimulus. Thus, oviposition is due (a) to attraction of gravid flies from a distance, in response to a " sheep factor " plus a " putrefactive factor " [see *V. B.* **7.** 280.] and (b) to stimulation of the attracted flies to oviposit, either by chemical or physical stimulus. —J. MacLeod.

Melvin, R., & Bushland, R. C. (1938). **Effects of Acidity, Alkalinity and Moisture Content of the Soil on Emergence of** *Cochliomyia americana* **C & P.**—*J. econ. Ent.* **31.** 611-613. 1 table.

Larvae of *Cochliomyia americana* C & P. were placed in purified sea sand, to which various amounts of sulphuric acid and potassium hydroxide solutions of different concentrations had been added; observations were then made on the number of adults which emerged. It was found that the larvae are more resistant to potassium hydroxide than to sulphuric acid, but their great tolerance to both chemicals indicates that the pH of the soil is a factor of negligible importance in relation to the emergence of adults in nature. With acid, alkaline or neutral solutions, as the moisture content of the sand increased, the emergence of the flies was correspondingly reduced.—R. P. Hobson.

Bartlett, K. A. (1939). **The Introduction into Puerto Rico of Beneficial Insects to Aid in the Control of the Horn Fly of Cattle.**—*Agric. Notes, P. R. agric. Exp. Sta.* No. 88. pp. 6. 2 tables. [Mimeographed].

The horn fly, *Haemotobia* [=*Lyperosia*] *irritans* (L.) is a serious pest during certain seasons of the year on the south coast of Puerto Rico. This paper describes in detail the steps taken to introduce insects likely to control these flies, but does not deal with the results obtained.

Since the larvae of *H.i.* breed in dung, they are susceptible to biological control by dung beetles. These beetles do not attack the larvae, but their habit of constructing balls of dung, in which to lay their eggs, reduces the number of available breeding places for *H.i.* A number of species of dung beetles, and one species of a true internal parasite of the horn fly, *Spalangia philippinensis* Full., were introduced from Hawaii and Texas. *S. phil.* is not specific in its tastes and attacks various dipterous puparia. Details are given of the number of specimens of dung beetles and of *S. phil.* imported and liberated in various districts. Two specimens of *Spalangia*, probably *philippinensis*, were recovered some four months after liberation.—R. P. Hobson.

du Toit, P. J. (1938). **The Horn Fly (*Lyperosia Minuta*) in South Africa.**—*J. S. Afr. vet. med. Ass.* **9.** 136-143. 1 fig.

After describing the occurrence of the horn fly in different parts of the world, the author mentions the methods of combating the insect in countries such as

Australia and some of the islands in the East Indies. 20 inches of rain per annum represents the minimum humidity at which the fly is able to exist. The fly has existed in some of the Eastern portions of South Africa for many years, without causing any alarm, but recently in Natal it has become a danger to stock. The methods of dealing with the pest are described in some detail. None of them appears to be of a very practical nature, particularly control by the use of insects parasitic on the pupae. The author suggests the use of a trap to catch the flies as they leave the cattle at the entrance to the dipping tank. If successful, this trap should be of great value to cattle farmers.—E. M. Robinson.

Oswald, B. (1939). **On Yugoslavian (Balkan) Ticks.**—*Parasitology.* **31.** 271-280. 2 figs., 1 table. [18 refs.]

A list, with classificatory notes and a host list, is given of 23 species of ticks occurring in Yugoslavia; it is based on published records supplemented by three years' personal observation. The distribution of the ten commoner species is mapped. The heaviest general incidence occurs in the south of Yugoslavia, east of Albania, due to the favourable climatic conditions and also to the primitive livestock agriculture. Ticks are also relatively numerous, both in species and numbers, along the Adriatic coast, with its Mediterranean type of climate. North of the rivers Sava and Danube the infestation is lighter, and consists of a limited number of species, such as *Ixodes* spp., *Haemaphysalis* spp., and *Dermacentor* spp., adapted to mild, humid conditions.

The differential seasonal occurrence on domestic animals in Southern Serbia, where ticks are most numerous, is given for the six principal species. *Ixodes ricinus*, *Haemaphysalis cinnabarina punctata* and *Hyalomma scupense* occur on animals principally in spring and autumn; *Dermacentor reticulatus niveus* occurs from April to October, but tends to be rather more numerous in May and September, while *Boophilus calcaratus balcanicus* and *Rhipicephalus bursa* are most numerous in summer.

Babesia and theileria infections of domestic animals and spirochaetal infections in poultry cause severe losses throughout the country. Tick paralysis and anaplasmosis have recently been recorded in the South. Tick paralysis, which is locally believed to have a triennial periodicity, was first recorded, in goats, sheep and calves, in 1935, and reappeared in the same districts in 1938. The outbreak of the disease coincided with the seasonal occurrence of the autumn species of ticks, but the vector could not be determined, since several species occurred on the affected animals.—J. MacLeod.

Bogoroditskiĭ, A. V., & Bernadskaya, Z. M. (1938). Novye perenoschiki theilerioza krupnovo rogatovo skota in bor'ba s nimi. [**New Vectors Transmitting Theileriasis**].—*Trud. Uzbek. nauchn.-issled. vet. Stan., Tashkent.* **10.** 3-17. 1 fig. [English summary].

Comparison of the chronology of theileriasis outbreaks with the life-cycle and habits of *Hyalomma detritum* suggested to the authors that this tick could not be the only vector of theileriasis in Uzbekistan. They studied the bionomics of *H. savignyi*, which is common in many regions of Uzbekistan, and tested its capacity to transmit the infection. This was done in the course of studying the development of otherwise unexplained outbreaks of the disease. At the same time the authors made similar studies with *H. asiaticum*. Larvae and nymphs, infected by feeding on infected animals, and allowed to moult, were placed on the ears or the scrotum of healthy calves born in the stables of the research station and protected from natural infection. These sites were chosen because, in addition

to being predilection sites of the ticks, the proximity of the lymph nodes permitted the observers to follow the reactions in the 4-5 days following the infection. Heifers 1½-2½ years old which had grazed during the summer on mountain pastures and had not contracted theileriasis were similarly dealt with.

It was found that both *H. savignyi* and *H. asiaticum* could act as vectors of the disease. As *H. asiaticum*, however, is found mainly in arid regions offering no grazing for cattle, its epizootic importance is regarded as slight. Where it does function as a vector, the incubation period of the disease is shorter than in the event of transmission by other ticks.

The life-cycle and habits of *H. savignyi* were such that the incidence of unexplained outbreaks of theileriasis could be accounted for by the assumption that this tick was responsible. The authors accordingly suggest a new scheme of pasture rotation adapted to the life-cycle and habits of *H. savignyi*. A detailed table of the life-cycle of this tick is given.—E. Martin.

PARASITES IN RELATION TO DISEASE [HELMINTHS]

Boughton, R. V. (1937). **Endo-Parasitic Infestations in Grouse, Their Pathogenicity and Correlation with Meteoro-Topographical Conditions.**—*Tech. Bull. Minn. agric. Exp. Sta.* No. 121. pp. 50. 12 figs., 10 tables, 4 maps. [Numerous refs.]

Owing to a decrease in the numbers of grouse, a parasitological survey was made from Minnesota, Michigan, Wisconsin and South Dakota and covered the examination of 560 ruffed and 62 sharp-tailed grouse. Although for a time the percentage of infestation increased and parasitized birds weighed less at autopsy than non-parasitized, B. considered that none of the parasites found were responsible for deaths of adult grouse, but probably predisposed them to secondary infections. *Raillietina tetragona* and *Ascaridia galli* were believed dangerous for young birds. In the ruffed grouse there appeared to be a definite correlation between the degree of parasitism and meteorological and topographical factors. A detailed list of the parasites recovered was included.

B. considered that no definite conclusions could be drawn until further work had been done, but felt reasonably convinced that the parasites found were not responsible for the decline in population. Those with maximum infestation seemed to be normal, healthy birds. It may have ultimately reduced their vitality so that secondary infections could occur. If the adult grouse population died off at a normal rate there would be fewer birds in the autumn than in the spring. This drop is not noticed in normal years because the birds hatched in the spring are big enough to replace the older birds in September. But if the young birds are killed off by parasites or disease, etc., the drop is immediately noticed. The occurrence of parasites at such an early age in young birds suggests that many are killed by parasites before reaching maturity.—M. L. Bingham.

Erlich, I. (1938). Paraziticka fauna pasa s područja grada Zagreba. [**Parasites of Dogs in Zagreb**].—*Vet. Arhiv.* **8.** 531-571. 2 figs., 2 tables. [Numerous refs.] [German summary].

The following helminth parasites were found in the course of an examination of 100 dogs from Zagreb :- *Alaria alata* 19 times ; *Metagonimus romanica* 5 times ; *Echinochasmus perfoliatus* twice ; *Dipylidium caninum* 53 times ; *Taenia pisiformis* 16 times ; *T. hydatigena* 7 times ; *Echinococcus granulosus* 6 times ; *Diphyllobothrium latum* and *Mesocestoides lineatus* once ; *Trichuris vulpis* 82 times ; *Uncinaria*

stenocephala 62 times ; *Ancylostoma caninum* 21 times ; *Capillaria plica* 39 times ; *C. aerophila* 12 times ; *Toxocara canis* 23 times ; *Toxascaris leonina* 8 times ; *Strongyloides stercoralis* twice ; *Spirocerca sanguinolenta* twice and *Linguatula serrata* 15 times. A key is given for the determination of helminth eggs in the faeces of dogs.

Skin parasites were :– *Demodex canis* twice ; *Ixodes ricinus* ; *Rhipicephalus sanguineus, Trichodectes canis* 8 times ; *Linognathus setosus* ; *Ctenocephalides canis* frequently, and *C. felis* occasionally.

The protozoan parasites found were *Isospora rivolta* 5 times, *I. felis* 4 times and *I. bigemina* once.

Two new species are described, one an *Isospora* and one an *Echinochasmus*. —B. Oswald (Križevci).

Antunes Tropa, E., & Pégo, F. (1938). Pesquisas parasitológicas em cães da cidade do Porto. [**Parasites of Dogs in the City of Oporto**].—*Repos. Lab. Pat. vet., Lisboa.* **4.** 133-144. [8 refs.] [English and French summaries].

100 stray dogs of all breeds and ages were examined during the year, revealing the presence of a formidable list of parasites. Only 1% harboured *Trichodectes* ; 86% carried *Ctenocephalus canis* (including 14% with *Pulex irritans* also). Tapeworms were discovered (11 species) in 43%. 15 species of ascarids were found. For the first time in Portugal the presence of *Mesocestoides lineatus* and *Spirocerca sanguinolenta* was recorded. 10% of the subjects were infested by *Ancylostoma caninum*.

Leishmania was observed in 1% of cases, but cutaneous lesions were absent. [Cf. Alveres and da Silva, Lisbon, who recorded 2·6% in 1910 and 3·6% in 1911 from a total of 409 dogs similarly examined].—J. Pasfield.

Erlich, I., & Mikačić D. (1939). Entoparazitička fauna nase kokoši. [**Internal Parasites of Fowls in Yugoslavia**].—*Vet. Arhiv.* **9.** 551-580. 1 fig., 1 table, 2 charts. [Numerous refs.] [Translation of French summary].

A hundred autopsies of healthy fowls from the surrounding districts of Zagreb were carried out and the following species were determined :–

One case of *Prosthogonimus pellucidus* in the oviduct ; one case of *P. ovatus* in the bursa Fabricius ; one case of *P. cuneatus* in the same organ ; one case of *Echinoparyphium recurvatum* in the small intestine ; 30 cases of *Amoebotaenia sphenoides* in the small intestine ; 24 cases of *Choanotaenia infundibulum* in the small intestine ; 53 cases of *Hymenolepis* (*Weinlandia*) *carioca* in the small intestine ; one case of suspected *Hymenolepis* (*Weinlandia*) *cantaniana* in the small intestine, determined only by the length of the cirrus pouch ; 68 cases of *Davainea proglottina* in the duodenum ; 61 cases of *Raillietina* (*Skriabinia*) *cesticillus* in the small intestine ; 23 cases of *Raillietina* (*Raillietina*) *echinobothrida* in the posterior part of the small intestine, in the caeca, and in the rectum ; 37 cases of *Ascaridia lineata* in the small intestine ; 71 cases of *Heterakis gallinae* in the caeca ; 30 cases of *Acuaria* (*Cheilospirura*) *hamulosa* in the gizzard ; 2 cases of *Cyathostoma bronchialis* in the trachea ; 2 cases of *Trichostrongylus tenuis* in the small intestine ; 18 cases of the same parasite in the caeca ; 16 cases of *Capillaria annulata* in the wall of the crop ; *Capillaria longicollis* in the intestine and in the caeca ; 46 cases of *Capillaria retusa* in the small intestine and in the caeca ; 1 case of suspected *Capillaria columbae* in the caeca. There were also 11 cases of the arthropod *Laminosioptes cysticola* in the subcutaneous tissue.

Spiruroid larvae were found on several occasions in the nodules of the mesentery and the crop.

Apart from these autopsies 150 intestines of fowls were examined.

Serious infestation was caused by *Hymenolepis carioca, Choanotaenia infundibulum, Davainea proglottina, Raillietina echinobothrida, Ascaridia lineata,* and *Capillaria longicollis.*

JOYEUX, C., & BAER, J. -G. (1937). Recherches sur l'évolution des cestodes de gallinacés. **[The Development Cycle of the Cestodes of Fowls].**—*C. R. Acad. Sci., Paris.* **205.** 751-753. [2 refs.]

J. & B. found and described the larvae of *Raillietina (Skriabinia) cesticillus* in two tenebrionid beetles, *Anthicus floralis* and (experimentally only) *Alphitophagus bifasciatus*, both of which are also natural hosts of *Hymenolepis diminuta.*

They also reported finding the larva of *R. (Raillietina) echinobothrida* in ants of the species *Tetramorium semilaeve*, in an ant-hill a few metres from a chicken run. [A further description of the larva was given in a later paper—*V. B.* **10.** 181].—E. S.

I. SERGENT, Em., FOURESTIER, M., & GALLIANO, E. J. (1939). Le virage de la réaction de Casoni après une dieuxième ou plusieurs intra-dermo-réactions. **[Fluctuations in Casoni's Reaction after Two or More Intradermal Reactions (in Echinococcosis)].**—*Bull. Acad. Méd. Paris.* **121.** 180-185. [6 refs.]

II. CAMBEL, P. (1939). **Rare Localizations of Hydatid Disease in Turkey. Report of a Case of Plurivisceral Echinococcosis.**—*Arch. Path.* **27.** 419-423. 2 figs. [7 refs.]

I. A case is described of pulmonary hydatid in which the Casoni reaction was negative three times, using formolized hydatid fluid, and was positive at the fourth test, when pure fluid was used. A second patient, tested with pure fluid, reacted first negatively and later positively. Autopsy revealed primary lung cancer, with cerebral metastasis.

Twenty-three helminth-free persons were then experimentally tested twice. All were negative at the first test, but 11 were positive at the second.

The authors regard these facts as additional evidence of the antigenic character of hydatid fluid. They conclude that Casoni's test, performed with pure hydatid fluid, positive at the first trial, is indisputable evidence of echinococcosis. [CHUNG and T'UNG (*V. B.* **10.** 273), found the reaction to be positive in some cases of syphilis and other diseases].

II. The author reviews cases of human hydatid in unusual situations as recorded in Turkey. There is a clinical record of a case of multiple hydatid of the viscera, in which the main cyst was in the spleen.—E. S.

LEVINE, P. P. (1937). **The Viability of the Ova of *Ascaridia lineata* when Exposed to Various Environmental Conditions.**—*J. Parasit.* **23.** 368-375. 2 tables. [6 refs.]

This article largely confirms and extends the findings of ACKERT and CAUTHEN [*V. B.* **2.** 506.] on the viability of *A. lineata* ova under various environmental conditions.

Eggs of *A. lineata* were either embryonated by incubation at 30°C. for 14-16 days in shallow distilled water, and then mixed in soil in such numbers that 10 g. produced an infection of at least 25 worms when fed to susceptible chicks (2-5 weeks old); or, they were embryonated by incubation after being mixed with soil. Non-embryonated eggs were also tested under the same natural climatic conditions.

Embryonated eggs in shade survived 242 days (March to November 1935) but died after freezing commenced in January, 1936. In sunshine they survived for 46 days (up to May 1935) but not 72 days. Non-embryonated eggs survived in shade for 279 days and in sunshine for 186 days from November 1935. The latter were dead by July (243 days).

Embryonated eggs, when dried in faeces, survived 21 but not 40 days. Non-embryonated eggs dried in soil were viable after 44 but not after 51 days.

Keeping embryonated eggs at –1°C. was lethal in 13 hours, but if previously cooled for 12 days (or 21 days) at 10°C. they survived at –1°C. for 14 days (or 5 days). The shock of rapid cooling to –1°C. is not lethal for *Capillaria columbae* and can therefore be used selectively for mixtures of *A. lineata* and *C. columbae* eggs.

The effect of putrefying faeces on embryonated and non-embryonated eggs of *A. lineata* and the comparatively long time (69-99 days) for embryonation to occur under natural soil conditions are described in detail.—C. V. WATKINS.

ORLOV, I. V. (1938). Metody prizhiznennoĭ differentsialnoĭ diagnostiki strongiliatozor zhvachnijkh. [**Methods of Vital Differential Diagnosis of Infestation of Ruminants by Strongyles**].—*Papers on Helminthology, commemorating 30 year Jubilee of K. I. Skryabin.* pp. 433-439. Moscow: Lenin Acad. Agric. Sci.

O. confirms the findings of MORGAN and of MÖNNIG regarding the classification of helminths from their larvae, but claims to have established further differential criteria. He substitutes certain morphological and structural characteristics for the size data given by MORGAN and MÖNNIG. Iodine instead of heat was used to kill the larvae, as O. found that heat frequently effaced finer structural details. A classified table of characteristics and a list of characteristics relating to *Strongyloides papillosus, Dictyocaulus filaria, Synthetocaulus* spp., *Nematodirus spathiger, Haemonchus contortus, Ostertagia circumcincta, Cooperia curticei, Trichostrongylus instabilis, Chabertia ovina, Oesophagostomum columbianum, O. venulosum* and *Bunostomum trigonocephalum* are given.—E. MARTIN.

ZILAHY, A. (1936). Adatok a szarvasmarha-Strongyloides ismeretéhez. [*Strongyloides* **Species Parasitic in Cattle**].—*Thesis, Budapest.* pp. 12. [14 refs.] [German summary].

Z. studied the morphological and biological nature of a species of *Strongyloides* parasitic in cattle, previously described under the names *S. bovis, S. longus,* or *S. papillosus,* and finally by BRUMPT (1921) as *S. vituli.*

The parasitic generation of this worm consists only of parthogenetic females 6-8 mm. long and 70-95μ thick.

The embryonated eggs are to be found in the fresh faeces and measure 53-56μ $\times$31μ. The eggs develop into free-living worms, usually females, 900-1300μ long and 40-70μ thick. The males are very rarely seen.

There seems to be an age immunity of cattle against *Strongyloides,* judging from the results of faecal examination of calves and full grown cattle. 60% of 400 young calves were infested, but no infestation was observed in 100 2-year-old animals. This species of *Strongyloides* was also able to infect rabbits.—G. S.

JOHANNSEN, H. (1937). Beitrag zur Klarung der Wanderung der Strongylus equinus-Larven im Tierkörper. (Versuche an weissen Mäusen). [**Migration of the Larvae of** *Strongylus equinus* **in the Animal Body**].—*Inaug. Diss., Hanover.* pp. 61. 4 figs., 3 tables. [Numerous refs.]

The experiments were carried out in white mice. To obtain larvae, the uteri

were removed from adult female parasites, broken up in physiological saline solution and mixed with sterile horse faeces, which were then incubated till the larvae had reached the infective stage. Each mouse received *per os* the same dose of larvae. Several of the mice received intraperitoneal and intramuscular injections of sterile horse serum several days before dosing, but this did not lower their resistance to infection. The mice were killed at varying periods after dosing in order to trace the route of migration of the larvae. It was found that they left the stomach without undergoing any change. Their long stay in the caecum together with the visible changes in the wall of the caecum and large intestine suggested that the larvae left the intestine at this point. Since no larvae were found in the intestinal capillaries, although they were numerous in the abdominal cavity, it was concluded that the larvae did not penetrate the blood vessels in order to reach the abdominal cavity, but burrowed directly through the intestinal wall. In the peritoneal cavity some of the larvae were attacked and killed by leucocytes. Other larvae entered the mesentery and wandered about in its folds, while others again invaded the liver and pancreas from the peritoneal cavity. By the time the larvae had reached the organs in the abdominal cavity they had moulted, though the exact point at which this took place could not be determined. A comparison is made between the larvae found in the intestinal wall by the author and those found by E. L. Taylor [(1930). *Ann. Trop. Med.* **24.** 545-561.] The larvae found by the author were from 0·716 mm. to 0·834 mm. long and from 0·013 mm. to 0·017 mm. thick, *i.e.*, longer and thinner than those described by Taylor.—A. L. Wilson.

Britton, J. W. (1938). **The Rate of Egg Production of *Strongylus equinus* and *Strongylus vulgaris* as Measured by Egg Counts and Qualitative Larval Cultures.**—*J. Parasit.* **24.** 517-520. 1 fig. [8 refs.]

The egg-laying capacities of adult female *Strongylus vulgaris*, *S. equinus* and *S. edentatus* were determined by means of an egg-count larval culture method. Egg counts and differential larval counts were correlated with numbers of adult female strongyles recovered from 15 horses at autopsy. The approximate rate of oviposition per adult female of each species was 1·8 EPG (eggs per gram of faeces) for *S. vulgaris*, 1·8 EPG for *S. equinus* and 2·1 EPG for *S. edentatus*.

—F. T. Boyle.

Mikačić, D. (1939). Neke primjedbe o Protostrongylus vrstama iz pluća ovce. [**Some Notes on *Protostrongylus* Species from the Lungs of Sheep**].—*Vet. Arhiv.* **9.** 126-133. [10 refs.] [French summary].

The identification, by different authors, of certain *Protostrongylus* species from the lungs of sheep is discussed, particularly of *P. ocreatus*, *P. rufescens*, and *P. commutatus*; attention is drawn to some diversity in their description. M. has found three specimens of *Protostrongylus* in Yugoslavia which, he believes, do not belong to any of the above three species, but are probably new. [See also *V. B.* **8.** 577].

—B. Oswald (Križevci).

I. Gaillard, H. (1937). L'évolution de *Dirofilaria immitis* Leidy chez *Aedes* (*Stegomyia*) *aegypti* et *A. albopictus* au Tonkin. [**The Development of *Dirofilaria immitis* in *Aedes aegypti* and *A. albopicta* in Tonkin**].—*C. R. Soc. Biol. Paris.* **125.** 130-132. [7 refs.]

II. Roubaud, E., & Colas-Belcour, J. (1937). Nouvelles recherches sur l'évolution expérimentale de *Dirofilaria immitis* chez quelques culicidés indigènes. [**Development of *D. immitis* in some Culicidae**].—*Bull. Soc. Path. exot.* **30.** 480-484. 1 fig. [8 refs.]

III. Roubaud, E. (1937). Nouvelles recherches sur l'infection du moustique de la fièvre jaune par *Dirofilaria immitis* Leidy. Les races biologiques d'*Aëdes aegypti* et l'infection filarienne. [**The Infection of** *Aedes aegypti* **with** *D. immitis*].—*Ibid.* 511-519. 1 fig., 1 table. [9 refs.]

I. Studying the transmission of cardio-vascular filariasis of the dog by *Aedes aegypti*, G. obtained 60% positive results. None of the microfilariae were arrested in the Malpighian tubes as is reported in III. An inhibitory action on the development of the larvae was, however, noticed. The results with *Aedes albopictus* were not good, as only one complete transmission was obtained.

II. The authors consider the above two species to be important second vectors of the disease, after *A. maculipennis*, the most important vector. They point out that the distribution of the infection is not limited to hot climates, as formerly believed, but corresponds very closely to the geographical distribution of the anopheline vectors.

III. Experiments indicated the existence of biological types of *Aedes aegypti* some of which transmitted the microfilariae only with difficulty or arrested them in the epithelium of the Malpighian tubes. Cuban, Tanganyikan and Assam strains of *Aedes aegypti* were used as vectors. The Cuban strains arrested the microfilariae in the Malpighian tubes, whilst the other two strains offered no resistance at all and the microfilariae underwent complete development in them. In further experiments to find out if this resistance to the microfilariae was hereditary, female Assam strains were mated with male Cuban strains. Some of the hybrids allowed complete development of the microfilariae, while others arrested them in the Malpighian tubes, thus proving that the resistance of certain strains was a hereditary factor.—A. L. Wilson.

I. Augustine, D. L. (1938). **Observations on the Occurrence of Heartworms** *Dirofilaria immitis* **(Leidy, 1856), in New England Dogs.**—*Amer. J. Hyg.* **28.** 390-395. [10 refs.]

II. Underwood, P. C., & Harwood, P. D. (1939). **Survival and Location of the Microfilariae of** *Dirofilaria immitis* **in the Dog.**—*J. Parasit.* **25.** 23-33. 2 tables. [19 refs.]

III. Phillips, J. H. (1939). **Studies on the Transmission of** *Dirofilaria immitis* **in Massachusetts.**—*Amer. J. Hyg.* Sect. D. **29.** 121-129. 4 figs. on 1 plate. [5 refs.]

I. A. found several cases of heartworm in experimental dogs of the Harvard Medical School and therefore undertook a survey of this parasite in the district.

He examined for filariasis the blood of 122 dogs and 10 silver foxes. Ninety-four of the dogs were located within 25 miles of Boston, Mass., and microfilariae were found in the blood of eight of these animals. Foxes from the same area were uninfected, and 28 dogs examined at Wonalancet, New Hampshire, were all negative. The parasite is apparently indigenous in eastern Massachusetts.

II. The length of life of the microfilariae of *Dirofilaria immitis* in the blood of dogs has recently become a subject of considerable interest, as one of the popular explanations of the periodicity of the microfilariae becomes invalid if the microfilariae normally live longer than a day or two. In an attempt to obtain information on their longevity, an uninfected dog was given an intravenous transfusion of blood containing 233,000 microfilariae of this parasite. The embryos survived in the blood of the dog for two years, 4½ months. When the animal was autopsied about 2½ years after infection no embryos could be found in the blood. Comparatively few of the introduced microfilariae appeared in the circulation following injection.

During the course of the experiment the recipient was treated once with butyl bromide for the removal of hookworms and with a lime-sulphur dip for mange. Neither treatment affected the survival of the microfilariae.

III. *D. immitis* infection was confirmed in 4 of the 32 dogs in a kennel in the region of Boston. Transmission was linked with six local species of mosquitoes, *Anopheles punctipennis*, *A. quadrimaculatus*, *Aedes triseriatus*, *A. excrucians*, *A. cinereus* and *Culex territans*. Of these, *Anopheles quadrimaculatus*, *Aedes excrucians*, and *A. triseriatus* had not previously been proved susceptible to infection. Mosquitoes did not develop immunity to reinfection with the parasite. Stable flies (*Stomoxys calcitrans*) ingested microfilariae when feeding on infected dogs, but it could not be proved whether or not they act as vectors. Fleas did not appear to be vectors.—F. T. Boyle.

Palmeiro, J. M., & Navarro Brazão, L. (1938). Alguns casos de oncocercose, em bois africanos, provocados pela Onchocerca Gibsoni. [*Onchocerca gibsoni* **Infestation in African Cattle**].—*Repos. Lab. Pat. vet., Lisboa.* **3.** 231-234. 2 figs., 1 table. [English and French summaries].

The authors record the presence of *Onchocerca gibsoni* in the connective tissues of cattle imported from Angola into Portugal for slaughter.—J. Pasfield.

Spindler, L. A. (1937). **Resistance to Intestinal Trichinosis in Experimental Animals induced by Feeding Metabolic Products of Encysted Trichinae.**—*J. Wash. Acad. Sci.* **27.** 36-38. 1 table. [3 refs.]

Metabolic products were obtained by digesting trichina-infested rabbit carcasses in artificial gastric juice so that any products of the encysted larvae would be liberated into the digestive fluid. Experiments were then carried out to ascertain whether the ingestion of such metabolic products would confer immunity to infestation.

The fluid was filtered, neutralized by N/10 NaOH solution and given by mouth to rats, rabbits and g. pigs. These animals and controls later received equal numbers of trichina larvae. The treated animals developed only 15·6 to 84·4% of the numbers of larvae developed in the controls. This immunizing power of the fluid was not destroyed by heating at 60°C. for 30 minutes.—A. L. W.

McCoy, O. R. (1935). **Artificial Immunization of Rats against** *Trichinella spiralis*.—*Amer. J. Hyg.* **21.** 200-213. 3 tables. [7 refs.]

Young adult rats were given courses of six intraperitoneal injections at 5-day intervals of living trichina larvae, heat-killed larvae, or dried and powdered larvae, each in suspension in saline. After an interval of 2-3 weeks (in one experiment after five weeks) they and the controls were then given *per os* 1/4 to 1/5 of the normal lethal dose of living larvae. The degree of immunity shown by the treated animals varied from none to an almost complete immunity. The rats had little or no resistance to the initial development of adult worms in the intestine, but lost such worms more rapidly than the controls, and showed a smaller amount of muscle invasion. Injections of living larvae produced a greater immunity than dead or powdered larvae. Artificial immunity was much less potent than that following an actual infection, and was much more readily broken down by large doses of larvae.—E. S.

Kotlán, A. (1939). Der heutige Stand unserer Kenntnisse über immunbiologische Fragen bei der Trichinose. [**Present State of our Knowledge on Immunobiology of Trichinosis**].—*Rep. 13th int. vet. Congr. 1938.* **1.** 688-

698. [Numerous refs.] [In German: English, French and Italian summaries. Discussion pp. 717-719 in English, French and German].

The range of hosts susceptible to *T. spiralis* is very wide and their susceptibility varies greatly. Generally, the more complete the susceptibility the more favourable are the conditions in the host for the development of the parasites and their larvae, as in rodents, carnivores and man, whereas when the susceptibility is only partial, as in ruminants, birds and solipeds, the conditions, though more or less suitable for the development of the sexual or intestinal stages, are not so favourable for the development of the larval stages. Tolerance is also very important and completely susceptible hosts show a variation of tolerance to invasion by trichinae, which can be measured by determining the minimum lethal dose of larvae.

The two following immunological phenomena induced by trichina infestation have received the most attention :- (1) Blood changes such as eosinophilia and a fluctuation in the normal constituents of the blood, and (2) the production of immune substances which increase the tolerance of the host during very heavy infestation. The immunity developing in the host is due to the presence of living developmental stages of the parasite and is antitoxic in nature. Furthermore, the serum from infected animals conveys passive immunity to slight infections in healthy animals, and further research will show whether this property may be increased to provide a useful antiserum in human infection.

Infestation stimulates the production of precipitins which can be demonstrated serologically on the 20th-25th day following infection. Further experiments should be made to ascertain whether the specificity of such serological tests could be improved by the use of specific fractions of the antigen, as for example a polysaccharide fraction.—A. L. Wilson.

Söntgen, K. (1939). Zur Frage der Fuchstrichinose. **[Trichinosis in Foxes].** —*Z. Fleisch- u. Milchhyg.* **49.** 334-336. [11 refs.]

18·5% in 1935, 9·3% in 1936 and 9·1% in 1937 of captured foxes in Dillenburg were infested with trichinosis, yet pigs reared in the same district were free from infection. Pigs known to have been fed on an infected fox carcass had trichinosis when killed. These conflicting findings raised the question of whether fox and swine trichinae are specific. To investigate this point three young pigs were fed with infested fox flesh; they became infected without difficulty.

In a study of the role of the field mouse in the transmission of trichinosis to foxes 521 mice were caught and examined; 20,840 specimens from these mice were examined, but no trichinae were found.—A. L. Wilson.

I. Wilkening, H. (1937). Hautreaktionen mit Trichinen-und Askarisantigen bei gesunden und mit *Ascaris lumbricoides* befallenen Schlachtschweinen. **[Skin Reactions to *Trichinella* and *Ascaris* Antigens in Healthy Slaughter Swine and Those Infested With *Ascaris lumbricoides*].**—*Inaug. Diss., Hanover.* pp. 44. [Numerous refs.]

II. Spindler, L. A., & Cross, S. X. (1939). **Intracutaneous Tests for the Detection of Trichina Infections Experimentally and Naturally Acquired by Swine.**—*Proc. helminth. Soc. Wash.* **6.** 37-42. 1 table.

I. *Ascaris* antigen prepared from the uteri of adult female parasites was inoculated endermically into the skin of the ear. 1:1000 dilution of the antigen being used on 50 pigs, 11 of which were infected. Three uninfected pigs and one infected pig gave positive reactions; there were 18 doubtful and 28 negative reactions. With a 1:100 dilution tested on 15 pigs, two positive, two doubtful and four negative reactions were obtained in infected animals, while one uninfected

animal was doubtfully positive. Powdered antigen was tested on four pigs, all of which gave a positive reaction, although only one of these animals was infected.

The trichina antigen was prepared from the infected flesh of g. pigs and inoculated endermically into 100 healthy pigs. Of these, 26 gave negative reactions, three were doubtful and one was positive [figures do not tally: ? 26 should be 96]. In one rabbit and 12 g. pigs, all of which were heavily infected and which were tested by the intradermal method, seven gave a positive reaction, one was doubtful and five were negative. With the endermic method two were positive, one doubtful, ten negative. Furthermore, negative reactions were obtained in two infected pigs by the endermic method, while a double intradermal test gave a weak positive reaction in one of them.

II. Investigations were made with a view to developing the intradermal test for the detection of trichina-infected swine prior to slaughter in an abattoir. The tests numbered 5,274 and were made with 55 different antigens on 1,493 swine. All the antigens were obtained from trichina larvae from experimentally infected rabbits or swine, and the pH varied from slightly acid to slightly alkaline. The dose varied from 0·1-0·2 c.c. in a dilution of 1:1000. The injection was made intradermally along the mid-line of the abdomen, the inner surfaces of the thighs or the skin at the root of the tail, the antigen being introduced by an instrument with three lancet-shaped points arranged in a triangle. The results showed that out of 550 tests made on 149 infected swine, no reaction was obtained in 29·8%. In only 48·7% were the reactions regarded as positive and in 22·5% the reactions were doubtful. Furthermore, in a series of 4,724 tests made on 1,344 animals regarded as free from trichinae, based on the examinations of material prepared from the diaphragm after digestion, 77·6% were negative and 8·6% positive. Suggestions to explain this sensitivity are :- (1) The presence of trichina proteins produced by young trichinae, unable to withstand artificial digestion, and so not detected in examination of the diaphragm ; (2) Prolonged consumption of scraps of pork containing non-viable larvae. Weak positive reactions may be due to this factor. (3) Injection of anti-swine-fever serum obtained from trichina-infested swine. (4) Infection with closely related parasites, *e.g.* whip-worms. The authors conclude that the test cannot be relied on as it is not specific and fails to detect all infested animals.—A. L. Wilson.

Videsott, R. (1938). Della tricocefalosi enzootica canina. [**Enzootic *Trichuris* Infestation in Dogs**].—*Nuovo Ercol.* **43.** 409-434. [Numerous refs.]

V. summarizes present-day knowledge of *Trichuris* including the biology and pathology, especially of *T. vulpis*. An enzootic of the disease in kennel dogs is reported for the first time. Two of these animals were used for a detailed study in which V. ascertained the presence of leucopenia and of a haemoglobin index indicating a hyperchromaemia. He was also able to confirm previous reports of the absence of eosinophilia in advanced stages of the disease. Successful treatment was carried out with thymol enemas, 3-4 g. of powdered thymol emulsified in 200 c.c. of water, and given at 47°-50°C., accompanied by light abdominal massage.
—Katharine Sanderson.

Hoeppli, R., Feng, L. C., & Chu, H. J. (1938). **Attempts to Culture Helminths of Vertebrates in Artificial Media.**—*Chin. med. J.* Suppl. No. 2. pp. 343-374. [Numerous refs.] [In English].

Rather more than half of this paper is a critical review of much earlier work by others in culturing helminths. Details are given of the culture methods used and the longevities attained by various workers with 14 parasites which have been

cultured fairly successfully, although there are no records of development having taken place in culture.

The authors have carried out extensive experiments with eight species, and have also been unable to stimulate development. Their most successful cultures were as follows :–

Adult *Clonorchis sinensis* were kept alive for five months at 37°C., in serum (horse, rabbit, cat or human) + Tyrode's solution, ± trace of glycogen, cystine, lecithin, haemoglobin or bile, or in heparinized rabbit plasma ± washed RBC or WBC of g. pig, the medium being changed weekly ; also kept alive without change of medium in diluted horse serum + 1/40,000 mercurochrome-220, or 1/8,000 prontosil, for 53 and 65 days respectively. In similar media, larval *C. sinensis* lived up to two weeks. They discharged the contents of the excretory bladder, but no further development occurred.

Adult *Schistosoma japonicum* were kept alive for just over five months at 37°C. in horse serum ± Tyrode's solution. Mercurochrome-220 and prontosil were, if anything, harmful.

Spirocerca sanguinolenta, from the mesenteries of a hedgehog, lived 11 weeks in Ringer's solution at 5°-8°C., either encapsuled or freed from the capsule, and six weeks with frequent changes of medium at 37°C.—E. S.

IMMUNITY

Nelson, W. E., Mitchell, A. G., & Brown, Estelle W. (1938). **The Possibility of Sensitization to Tuberculin.**—*Amer. Rev. Tuberc.* **37.** 286-310. 11 tables, 2 charts. [Numerous refs.]

Previous studies of this subject are discussed. The writers record work carried out in an attempt to ascertain if tuberculin administered intradermally in doses normally used for testing can induce sensitization. Using three tuberculins, O.T., P.P.D., and MA-100, groups of children, who were at first negative to the tuberculin test, were treated and tested at intervals.

Although in some instances the evidence was suggestive of some degree of sensitization, the authors consider that other factors were more likely to have been the cause.

A series of tests in g. pigs showed no evidence of cutaneous sensitization, and as a result of their study, the authors conclude that there is no evidence that tuberculin sensitization is induced within the limits of the amount of tuberculin injected in the ordinary course of intradermal testing.—J. Reid.

Feldman, W. H. (1939). **The Rôle of the Avian Tubercle Bacillus in the Sensitization of Cattle to Tuberculin.**—*J. Amer. vet. med. Ass.* **95.** 152-157. 1 table. [8 refs.]

Sensitivity of cattle to tuberculin, especially by " non-visible lesion reactors " is discussed, and reference is made to the recent work by Plum on sensitization of cattle by avian type bacilli [*V. B.* **10.** 159]. Any sensitivity of cattle to tuberculin seems to imply morbid tissue changes, even if difficult or impossible to demonstrate, and F. rather discounts any possibility of the conditions being set up by organisms other than the three main types of *Mycobact. tuberculosis.*

The pathogenicity of avian tubercle bacilli for pigs, sheep and cattle by natural infection has been well established. Plum states that the pregnant uterus of cows is a predilection site of such infection, although the concensus of opinion is that lymph nodes of the alimentary tract are most commonly affected.

F. reviews recent work upon the sensitivity to mammalian tuberculin of cattle exposed to avian type infection, and suggests that many " non-visible lesion reactors " which occur in the U.S.A., in cattle tested with mammalian tuberculin, may result from avian type sensitization, and that this should be especially considered when mammalian type infection appears improbable and poultry disease is known to be prevalent.—C. V. Watkins.

Frappier, A., & Fredette, V. (1939). Influence de la voie d'inoculation et de la virulence des bacilles tuberculeux sur le développement et l'évolution de la sensibilité dermique à la tuberculine chez le cobaye. [**Influence of the Method of Inoculation and the Virulence of Tubercle Bacilli on the Development of Skin Sensitivity to Tuberculin in the G. Pig**].—*C. R. Soc. Biol. Paris.* **131.** 760-763. [6 refs.]

The authors show by graphs the average allergic response to tuberculin in groups of g. pigs treated with 0·0001 g. of virulent *Mycobacterium tuberculosis* by subcutaneous, intradermal and intraocular injection, with 0·01 g. of BCG by subcutaneous, intradermal and intraperitoneal injection, and by oral administration of 0·05 g. of BCG. All the g. pigs were periodically tested until they died for their allergic response to minimal doses of tuberculin.

It is shown that intradermal injection of virulent *M.t.* produced the greatest allergic response to 0·00000166 c.c. of tuberculin at the 60th day. Allergy produced by subcutaneous injection of virulent *M.t.* or BCG was irregular, less in extent and less durable than after intradermal injection. Oral dosage of BCG caused sensitivity equal to that following smaller dosage by intradermal or intraperitoneal injection, but only after a much longer interval.—C. V. Watkins.

Limbek, L. (1938). Az intradermalis tuberculinpróba során jelentkezo elváltozások gümőkóros tyúkok toroklebenyében. [**Histological Changes of Wattles of Tuberculous Hens After Intradermal Tuberculin Injections**].—*Thesis, Budapest.* pp. 16. 3 figs., 1 table. [5 refs.] [German summary].

In a series of experiments, L. studied the histological changes in the wattles of fowls reacting positively to the tuberculin test and found the reaction to consist of two distinct phases, only the first of which corresponds to the non-specific reaction to tuberculin observed in normal subjects. This first phase consists of an infiltration of the corium and subcutis with a serous fluid containing many pseudo-eosinophile leucocytes. This oedema later recedes and gives way to the specific inflammatory reaction, *i.e.* a histiolymphocytic infiltration of the perivascular tissue which reaches its peak at the 48th hour, remains more or less stationary until the 72nd and does not disappear until the 120th hour.

A detailed description of the histological picture after 4, 8, 16, 24, 36, 48, 72, 96 and 120 hours is given, together with three figures showing sections through a normal wattle and two wattles into which tuberculin had been injected 4-48 hours previously.—G. Sályi (Budapest).

Cambau. (1939). Cas mortel d'anasarque provoqué par une intra-dermo-malléination palpébrale. [**Death in a Horse, Affected with Dropsy, after an Intradermo-Palpebral Mallein Test**].—*Rev. vét. milit.* **23.** 177-179.

C. describes the effects of an intradermo-palpebral mallein test of a mare which had been under treatment for dropsy [no further details] for six days. Death from pulmonary oedema occurred in about 36 hours following sudden symptoms of dyspnoea, bilateral epistaxis, wine coloured nasal mucous membranes and cording of the lymphatics of the cheeks and lips. C. considers the effect was due to intoxication (by mallein) of the vaso-motor centres.—C. V. Watkins.

Brown, H. C., & Broom, J. C. (1939). **Observations on the Agglutination Test for Weil's Disease.**—*Brit. med. J.* June 10th. 1178-1179. [2 refs.]

The authors demonstrated the variable agglutinability of formolized cultures of *Leptospira icterohaemorrhagiae* strains, employed as antigen against a serum which consistently gave a titre of 1 in 3,000 with a standardized formolized leptospira antigen. In the absence of a reliable method of standardization for leptospira cultures, examination of the floccules with a $\frac{1}{12}$th inch objective and dark ground illumination is advocated, to ensure detection of false positive reactions.—R. O. M.

Miles, A. A., & Pirie, N. W. (1939). **The Properties of Antigenic Preparations from Brucella melitensis. III. The Biological Properties of the Antigen and the Products of Gentle Hydrolysis.**—*Brit. J. exp. Path.* **20.** 278-296. 5 figs., 4 tables. [Numerous refs.] [For parts I and II see *V. B.* **10.** 15].

Increasing degrees of hydrolysis at 100°F. with N/10 HCl of the substance (AP) which remains after the removal of the phospholipoid (PL1) and the substance S, by breakdown of the antigenic complex (PLAPS) of *Br. melitensis*, produced :– (1) loss of serological activity, toxicity and power to produce lesions in hypersensitive animals ; (2) loss of characteristic physical properties ; (3) liberation of another phospholipoid (PL2) ; (4) liberation of free phosphoric acid, and (5) the appearance of amino groups and free formic acid. The physico-chemical properties of the phospholipoid (PL2) are described.

The antigenic power of AP, PLAPS and disaggregated PLAPS was measured by the formation of agglutinins in six g. pigs and 24 rabbits, by skin reactions in groups of 4-8 sensitized g. pigs and rabbits and by protection against toxic doses of AP. The native antigen (PLAPS) proved more antigenic than any of its derivatives. The simplest product of hydrolysis which precipitated with high dilutions of antiserum was a complex of phospholipoid and the N-formyl derivative of an amino-polyhydroxy substance. By intraperitoneal injection of 60 mice, single small doses of AP were found to confer some protection against subsequent lethal doses of AP. In a comparison of the toxicity of various fractions of *Br. melitensis* antigen in groups of ten mice and in 16 rabbits, AP appeared 12.6 times as toxic as PLAPS, but rapidly lost its toxicity upon hydrolysis.—R. O. Muir.

DISEASES, GENERAL

I. Curasson, G. (1938). Répartition géographique des maladies tropicales. [**Geographical Distribution of Tropical Diseases**].—*Rep. 13th int. vet. Congr. 1938.* **2.** 810-815. [In French : English, German and Italian summaries].

II. Donatien, A., & Lestoquard, F. (1938). Sur quelques maladies subtropicales du bassin méditerranéen. [**Some Sub-Tropical Diseases of the Mediterranean Basin**].—*Ibid.* 791-799. [In French : English, German and Italian summaries. Discussion pp. 808-809 in English and French]. [Also appeared in *Arch. Inst. Pasteur Algér.* **17.** 322-330. (1939)].

I. It was pointed out that there is considerable confusion as to what is meant by a tropical disease, and it was suggested that such diseases might be divided into two classes, the first those that are confined to tropical conditions, and the second those which though more prevalent in the tropics may from time to time occur in sub-tropical or temperate climates. Tropical diseases were divided into those due to viruses—horse-sickness, bluetongue, Rift valley fever, Nairobi sheep disease and three-day sickness, which are all largely confined to Africa ; those due to

bacteria and moulds—rickettsial infections, certain forms of actinomycosis, sporotrichosis, rhinosporidiosis and epizootic lymphangitis ; and those due to parasites which are favoured by damp humid conditions and bad methods of management, or like the blood protozoa are transmitted by biting arthropods. Amongst sporadic conditions prevalent in the tropics are diseases due to dietetic deficiencies, plant intoxications and photosensitization.

II. The authors discussed canine leishmaniasis, piroplasmosis, bovine theileriasis and rickettsia of monocytes.

Canine leishmaniasis is wide-spread round the shores of the Mediterranean sea, and is considered important as the dog probably forms the reservoir for human visceral leishmaniasis. The disease is described as an infection of the reticulo-endothelial system. In some cases emaciation and cachexia may terminate in death after the development of uraemia or haemorrhagic enteritis. In other cases the disease may occur simply as a skin infection associated with ulceration, whilst in others animals may be affected for years without exhibiting clinical symptoms. Although the formol-gel and flocculation tests may be useful guides to diagnosis, the parasite should be demonstrated, and search should be made of the juice of superficial lymph nodes, bone-marrow and serous exudate from skin scrapings. The most suitable site for skin scrapings is the tip of the tail. The parasites can be found in apparently healthy skin. Treatment with antimonials only gives temporary relief.

A note was given on classification of piroplasms, which were divided into the three genera *Piroplasma*, *Babesiella* and *Nuttallia*. *Anaplasma* and *Theileria* were not considered to belong to the family *Piroplasmidae*.

Three species of *Theileria* were recognized, *Th. mutans*, *Th. parva* and *Th. dispar*, *Th. annulata* being considered a synonym of the last. *Th. dispar* infection in North Africa is transmitted by the tick *Hyalomma mauritanicum*, and may cause a mortality of 20-40%. Recovered animals may harbour the parasite for some years. Infection can be transmitted by subinoculation of blood from an animal in the acute stage, and immunization can be carried out by the use of a benign strain. Curative treatment has not proved satisfactory.

Rickettsia of the monocytes of dogs, cattle and sheep were briefly mentioned, the diseases they produce being characterized by an acute febrile stage followed by a chronic infection that may persist for 18 months.

The nature of " premunition " was discussed and it was pointed out that methods of immunization which leave the treated animal a carrier tend to increase the sources of virus. This objection does not apply to immunization against *Th. dispar*, as the strain used has lost its power of developing in ticks.—U. F. R.

Shanks, P. L. (1939). **Methods Adopted to Control Disease on a Pig Farm.**—*Vet. J.* **95.** 445-450.

A marked reduction in the incidence of disease followed a change to complete housing and improved hygiene on a large farm in Northern Ireland where pigs previously had been maintained in open sheds. In S.'s opinion the optimum temperature for pigs less than eight weeks old is about 80°F., and for pigs over that age about 70°F. After the change of system paratyphoid and necrotic enteritis ceased to appear.

Outbreaks of pneumonia occurred as frequently as before in the warmer and more comfortable surroundings. M. & B. 693 was effective in the treatment of these cases, and was beneficial also in acute arthritis of pigs and in post-parturient fevers of sows.—D. D. Ogilvie.

LOVELL, R. (1939). **Causes of Deaths among Calves in Dairy Herds.**—*Vet. Rec.* **51.** 1081-1094. [Numerous refs.]

A review of the more common causes of calf mortality on the farm. The article deals with colibacillosis (white scours), salmonellosis, *Corynebacterium pyogenes* infection, pneumonia due to haemolytic cocco-bacilli, pasteurellosis, helminthiasis and other diseases, including calf-diphtheria, coccidiosis and hydrocyanic acid poisoning. Colibacillosis is differentiated from simple nutritional scour, and the role of colostrum and vitamin "A" in control of the former is discussed.

The relation between salmonellosis in calves and food-poisoning in human beings is dealt with.

The relative importance of pasteurellae as causes of calf pneumonia is assessed. The effect on the host of intestinal parasites, including *Trichostrongylus*, *Ostertagia*, *Cooperia* and *Haemonchus* and of the lung-worm *Dictyocaulus viviparus*, is described.

The relative incidence of the several causes of calf mortality is analysed and appropriate prophylaxis and treatment are suggested in each case.

A discussion by those who attended the meeting is appended.—H. BURROW.

I. FRASER, A. C. (1939). **Notes on Diseases of the Foal.**—*Vet. Rec.* **51.** 923-928.
II. ANON. (1939). **Diseases of Foals.**—*Ibid.* 933-934.

I. F. gives a brief survey of conditions diagnosed on clinical grounds as septicaemia in foals, mentioning the organism considered to be chiefly concerned, the likely paths of infection, and the clinical manifestations.

He considers that infection is most commonly through ingestion, particularly as in the first days of life there is no layer of mucus to protect the epithelium of the stomach and intestine.

General prophylactic measures and treatment of individual cases are dealt with. F. has found that the use of sulphanilamide preparations in streptococcal and other infections causing joint-ill in foals has yielded useful results.

Other diseased conditions affecting the newly-born foal mentioned and briefly described are retention of meconium, jaundice and pervious urachus. " Barking " is a condition of unknown aetiology which may attack the thoroughbred foal in the first twelve hours. The symptoms are blindness, spasms of groups of muscles, staggering, and then recumbency with galloping movements, and spasms of the neck and jaw muscles, accompanied by a repeated noise in the throat resembling the yapping of a terrier. Prognosis is grave, as most cases die of exhaustion in a day or two. Treatment apparently successful in some cases has been the use of a sedative and dextro-calcium subcutaneously combined with the administration of oxygen.

" Bruised heart " sometimes occurs, probably due to compression during parturition. The foal does not thrive, and P.M. examination shows partial or complete fracture of one or more ribs on either side, usually including the fifth rib, discoloration of the heart muscle, and effusion into the pericardium.

II. This editorial points out that there has been little research work in this country on diseases of foals. It refers to the activities of DIMOCK *et al.* in America during recent years. DIMOCK, in the light of recent researches, holds the view that streptococcal infection as a cause of navel-ill in foals, is usually, if not always, a pre-natal infection. Also he is of the opinion that *Bact. equirulus*, living as a saphrophyte within the mare, may infect the foetus. *Strongylus vulgaris* is considered by him to be an important factor in the infection of older foals.—R. I.

Anon. (1939). **Review of the 1938-39 Laying Trials.**—*Harper Adams Util. Poult. J.* **24.** 445-500. Numerous tables.

This review tabulates weather records (rainfall, rainy days and total sunshine all above the average for 10 years), averages of egg production (general, breed and pen averages), egg sizes and prices, food costs and mortality. Entries to the trials totalled 1,263 (including 96 ducks and 65 birds in the second year of a two-year trial). [These are the annual Harper Adams Laying Trials].

Records of mortality at trials from 1922-39 in comparison with average losses at all recognized laying trials show slightly higher figures for the former in most years. Mortality for the year under review (18·2%) was less than in the peak year 1936-37 (21·3%), but shows a slight upward trend compared with 1937-38 (18·0%). Losses during the last half of the trial period were again about double those in the first six months.

The analysis of causes of death gives the low figure of 0·5% of neurolymphomatosis cases. No specific mention of any nerve lesions is made in the table of P.M. findings, so that correlation between the two tables as regards fowl paralysis is impossible. The analysis of deaths shows parasitic diseases (38·7%), diseases of the reproductive organs (26·1%) and diseases of the digestive organs (14·6%) to be the most important groups. It is again impossible to determine what proportion of ovarian tumours were of the fowl paralysis type by the table of P.M. findings.

The increasing mortality among ducks was again noted (7·3%) but there were few entries in this section.

All the entries in the final period of the two year trial had exceeded a standard egg production in the first year. None were eligible for final award unless both production and mortality were of the required standard.—C. V. Watkins.

San Agustin, G. (1939). **The Control of Animal Diseases in the Philippines.**—*J. Amer. vet. med. Ass.* **95.** 293-298. 4 photographs.

The author reviews the activities of the Bureau of Animal Industry in the Philippines. A serum laboratory was established in 1902 and a Veterinary Division created for the investigation and eradication of animal diseases. A veterinary college was established in 1910. The Bureau of Agriculture was divided into two bureaux, " Animal Industry " and " Plant Industry ", in 1930. Rinderpest is the primary concern of the Bureau of Animal Industry. Rinderpest vaccine is now used on a large scale, and general vaccination of all buffaloes and cattle in the infected and adjoining territories is carried out. The disease is now confined to the southern portion of the Island of Negros.

Anthrax is controlled by the use of a spore vaccine. Seasonal mass inoculation with haemorrhagic septicaemia vaccine is undertaken in territories where the disease is endemic. Foot and mouth disease gained an entrance in 1911 and has gained a strong hold in some parts, especially where the Nellore cattle blood predominates. The disease is however confined to definite bounds and its eradication is thought to be in sight. Surra is prevalent and hinders the development of the horse industry. Blood examinations and serological tests with strict quarantine check the spread of the disease.

Glanders is wide-spread and is controlled by tests and slaughter. Bovine TB. is not rampant in the Islands, except on dairy farms where imported animals are used. Abattoir statistics indicate that the incidence of the disease is negligible in native cattle and buffaloes.

Contagious abortion has been prevalent in imported dairy cattle. Imported animals are tested at the point of origin ; only non-reactors may be imported. Swine plague and swine fever, fowl plague, fowl cholera and fowl pox are wide-

spread. Rabies is controlled by mass vaccination of dogs in areas where a case is diagnosed.

Other less important diseases are anaplasmosis, Texas fever and cow pox in cattle : epizootic lymphangitis, strangles and tetanus in horses, swine pox, kidney and lung worm infestation and cysticercosis in swine, and nodular disease in sheep and goats. All imported animals must be accompanied by a certificate of health from the country of origin.—J. A. Griffiths.

Carta, A. (1938). Osservazioni morfologiche su milze di cani con leishmaniosi e con leishmaniosi ed altre infestioni associate. [**The Spleen of Dogs with Leishmaniasis and Helminthiasis**].—*Nuovo Ercol.* **43.** 435-445. 3 figs. [3 refs.]

C. examined the spleens of 12 dogs affected with leishmaniasis. Histological details are given, but these appear to vary considerably. The main changes seen were hyperplasia of the Malpighian corpuscles associated with increased numbers of lymphocytes in the cordon of Billroth, and an increased density of the reticular fibres in both of these structures. Three spleens from dogs dying of leishmaniasis combined with ancylostomiasis, showed also an increased amount of blood in the red pulp ; and one spleen from a dog dying of leishmaniasis and filariasis showed a number of haemorrhagic infarcts.—Katharine Sanderson.

Manninger, R. (1939). **Diseases of the Digestive System of Young Pigs.**—*Vet. Rec.* **51.** 1159-1171. 8 figs.

M. reviews gastro-enteritis of new-born pigs (piglet dysentery) and pig-paratyphoid (necrotic enteritis). The former disease has been associated with a variety of bacteria, all of which are known facultative pathogens, but it is almost certain that the role of these organisms is one of secondary invasion, consequent upon some constitutional defect, the possible causes of which are discussed. In those countries in which it occurs, brucellosis is probably of considerable importance since infected litters may be farrowed at full term only to die off from dysentery within a few days of birth. Nutrition is undoubtedly of great significance, and M. cites instances of farms on which there is a greater mortality from dysentery among the progeny of the older sows than amongst that of the younger ones ; this is adduced as strong evidence of a gradual depletion of the maternal reserves of vitamins and minerals, with dire effect upon intra-uterine development and upon the quality of the milk secretion. Bad housing and hygiene, which tend to increase the number of potentially invasive organisms, facilitate the rapid spread of the disease amongst litters, and are probably the real explanation of the alleged " increase in virulence " of the bacteria concerned.

Paratyphoid amongst young pigs is, in M.'s experience, always caused by *Salmonella cholerae-suis*, this organism having been recovered without exception from the carcasses of 525 affected animals. As *S. cholerae-suis* " is found throughout the intestinal contents of a certain proportion of healthy pigs ", it follows that any factor which tends to reduce individual resistance—*e.g.* diet, damp sties, travelling, worms or the reaction following vaccination—will facilitate an outbreak of the disease. M. contests the opinion of Radtke [*V. B.* **8.** 38.] that the virus of piglet influenza is the agent responsible for rendering the young pig susceptible to paratyphoid. Of the 525 cases mentioned above, 347 (63·7 %) had a catarrhal pneumonia, which fact was considered to be evidence that the animal was affected with influenza, but the joint appearance of the influenza and paratyphoid was due only to common predisposing causes.

Both diseases are, therefore, almost certainly due in large measure to faulty

animal husbandry ; their prophylaxis is not easy, and in neither is immunotherapy of much value.

[M.'s paper also includes an account, the accuracy of which is certain to be a matter of contention, of the differential mode of formation of swine-fever ulcers and of the ulcers found in paratyphoid. The original, with its accompanying diagrams, should be consulted for this].

In the discussion which followed, POWLEY strongly advocated the outdoor system of rearing. KEARNEY alluded to the low incidence of gastro-enteritis amongst young pigs in Southern Ireland, where access to green pastures, milk and freshly-grown foodstuffs is allowed, and he also cited the case of a large farm on which influenza had been rife for many years, but on which no cases of salmonella infection had been detected. DOWNHAM claimed that the addition of 1:10,000 brilliant green to the swill is of value in combating bacterial infection of young pigs.—ALASTAIR N. WORDEN.

HALLMICH, P. (1939). " Chronische Brustfellentzündung " beim Elefanten ? [**Chronic Pleurisy in Elephants**].—*Dtsch. tierärztl. Wschr.* **47.** 327-328. [5 refs.]

FRIES (1939) reported chronic pleurisy in an elephant, with adhesions between the lungs, pleura and diaphragm. H. states that such adhesions are normal in both Indian and African elephants. The adhesions contain a large amount of elastic tissue and firmly unite the lungs to the thoracic wall and diaphragm during respiratory movements. There is no pleural cavity. These facts were described by EVANS [(1910). Rangoon : Supt. Govt. Printing.], in his book on elephants and have since been confirmed by numerous workers.—E. G. WHITE.

DAY, F. T. (1939). **Sterility in the Mare Associated with Irregularities of the Oestrus Cycle.**—*Vet. Rec.* **51.** 1113-1126. 7 figs. [6 refs.]

Infertility in mares each year is 40 % in heavy mares and 33 % in thoroughbreds. In general, and assuming that there are no irregularities of the female genital tract, and that a stallion of high fertility is used, this is due largely to mating at a time which is not the most favourable to successful fertilization.

Aspiration of air through the vulva, owing to faulty conformation or previous injury, can be corrected by suturing the upper commissure. The oestrous cycle and changes in the ovaries during oestrus and dioestrus are fully described and illustrated. The appearance P.M. of ovaries from mares with normal and abnormal oestrous cycles vary considerably. In the abnormal mare it is seldom that a corpus luteum is found.

The mares which fail to come into oestrus are usually :– (1) in poor condition, or (2) over-fat. In the former case palpation reveals no follicles in the ovaries, and in regard to the latter, although there may sometimes be a short oestrus, ovulation does not occur. In this case follicles persist and become cystic.

Puncture of the follicles or cysts is only likely to yield successful results in producing a return to a normal cycle when only one or two are present in the ovary and are 3-5 cm. in size. The individual response of mares to the injection of follicle stimulating hormones varies considerably, and no response is obtained in mares in anoestrus.—R. ISHERWOOD.

LAGERLÖF, N. (1938). **Infertility in Male Domestic Animals.**—*Rep. 13th int. vet. Congr. 1938.* **1.** 214-239. [In English : French, German and Italian summaries. Discussion pp. 239-241 in French and German].

L. stressed the importance of ensuring that the male stud animals are fertile.

Forms of infertility are grouped under three headings :– (1) lack of sexual desire ; (2) incapacity to copulate (impotentia coeundi), and (3) incapacity to fertilize (impotentia generandi). Defects due to the first two groups have been dealt with for many years and their causes are often readily ascertainable, but the third group presents considerable difficulty.

Impotentia generandi is caused by morbid changes or functional disturbances in the testicles, epididymis, seminal ducts or the accessory sexual glands. L. examined the semen or sexual organs of 1,000 male animals, and found that the commonest changes in the testicles which give rise to disturbances in spermiogenesis are :– (1) testicular hypoplasia (about 23 % of all cases) ; (2) degenerative changes in the seminal epithelium (about 41 %) ; (3) fibrosis testis (about 12 %) and (4) inflammatory testicular changes (about 24 %).

In bulls there are varying degrees of testicular hypoplasia ; firstly, cases in which no spermiogenesis proceeds, and secondly those in which some of the seminal ducts are undeveloped, while at the same time in other ducts spermiogenesis is normal. It is considered that in all probability hormonal disturbances are the causes of degenerative changes in the seminal epithelium ; the first symptom of this condition is the occurrence of pathologically changed spermatozoa. The seminal epithelium in mild cases of degeneration appeared to be capable of regeneration after the cause of the condition had been removed.

Fibrosis testis is the final stage of general atrophy of the seminal epithelium, in which complete destruction of the seminal ducts occurs, together with formation of fibrous tissue. It was found that by placing a heat-insulating cover over the scrotum of bulls for 4-5 days, there was no material diminution in the number of spermatozoa, but there was a considerable increase in the number of pathological spermatozoa.

Orchitis in bulls is usually due to infection by *Brucella abortus*. Formation of abscesses in the seminal vesicles may be caused by *Br. abortus*, *Mycobacterium tuberculosis*, *Corynebacterium pyogenes*, or streptococci. Streptococcal infection in the semen of bulls is a common cause of sterility in cows.—R. Isherwood.

Bonne, C. (1939). **Morphological Resemblance of Pulmonary Adenomatosis (Jaagsiekte) in Sheep and Certain Cases of Cancer of the Lung in Man.**—*Amer. J. Cancer.* **35.** 491-501. 12 figs. [Numerous refs.]

The literature dealing with this condition is reviewed from the original observations on " Jaagziekte " to the recent papers by Dungal *et al.* [*V. B.* **8.** 651, **9.** 104.]. Similar lesions have been described in g. pigs and mice. The epithelial proliferation in each species involves the bronchioles and alveoli ; in the g. pig there is considerable production of mucin, whereas in sheep it is abundant only if there is a concomitant bronchitis.

Several cases of adenomatosis of the lungs have been recorded in man, and B. records in detail a further case in a Chinese in whom at autopsy both lungs were almost completely replaced by a diffuse homogeneous tumour. The histological picture resembled closely that of adenomatosis in sheep. The epithelial proliferation showed signs of active growth in the form of numerous mitoses and budding, but invasive and destructive changes were almost entirely lacking, there was no necrosis and the hilar lymph nodes showed no sign of metastases ; the term " carcinosis " is to be preferred to " carcinoma ". The possibility of a virus origin is mentioned.—E. G. White.

Anon. (1939). **Investigations on Rabbit Myxomatosis.**—*J. Coun. sci. industr. Res. Aust.* **12.** 161-162. 1 fig.

The epidemiology of the disease in two experiments with closed colonies, to

which deliberately infected animals were introduced, is briefly described. The methods used in disseminating the disease were far beyond those which could ordinarily be used in the field, and it is concluded that the unaided virus would be valueless in controlling wild rabbit populations.

There is, however, the faint possibility that the " red rabbit flea " may be a suitable vector for transmitting the virus, and it is proposed to investigate this fully.—H. B. Carter.

Ide, H. G., Harvey, R. A., & Warren, S. L. (1939). **Role Played by the Trauma in the Dissemination of Tumor Fragments by the Circulation. Tumor Studied: Brown-Pearce Rabbit Epithelioma.**—*Arch. Path.* **28.** 851-860. 2 figs. [7 refs.] [Authors' summary copied *verbatim*].

Blood vessels developing within the Brown-Pearce rabbit epithelioma transplanted into an ear chamber are extremely friable, since even large vessels (50 to 200 red blood cells in diameter) may have walls consisting only of endothelium. Small tumor fragments that have broken loose near a ruptured vessel may readily be swept into the large capillaries and thus into the general circulation. This seems to be a rather common occurrence in the tumor growing in the ear chamber, yet the development of tumor metastases has not been noted in over 105 such experiments. Study of the local defence of body organs, particularly the lungs, against tumor fragments should be of considerable interest.

Baatz, H. (1938). Beziehungen zwischen dem Krebswachstum und dem inkretorischen Milieu. Biologische Untersuchungen am Spontan- und Impftumor der Maus. [**Relation between Tumour Growth and the Hormone Level. Pathological Investigations on Spontaneous and Transplantable Mouse Tumours**].—*Z. Geburtsh. Gynäk.* **117.** 64-86. 1 fig. [Numerous refs.] [Abst. in *Amer. J. Cancer.* **36.** 129, copied *verbatim.* Signed: Wm. H. Woglom].

The author reviews cancer research and mentions briefly a few of his own experiments. Castration before inoculation was found to inhibit definitely the growth of the Ehrlich mouse carcinoma, whereas castration after inoculation stimulated the tumor. The results with spontaneous mouse carcinomas were inconclusive. Follicular hormone accelerated the growth of spontaneous mouse carcinomas, and prolan seemed rather to stimulate than inhibit. Pregnancy delayed the Ehrlich carcinoma but hastened the growth of spontaneous neoplasms.

The many discordant results found in the literature are referred to the use by various investigators of different methods, different tumors, different animal species, and different pharmaceutical preparations.

An extensive bibliography accompanies the article.

Blanchard, L., Poisson, J., & Drieux, H. (1939). " Pathologie comparée des tumeurs du thymus. Son intérêt pour l'histogénèse ". [**Comparative Pathology of Thymic Tumours. Its Histogenetic Interest**].—*Rec. Méd. vet.* **115.** 392-413. [7 refs.]

In an earlier paper [*V. B.* **9.** 727] ten thymic tumours were described in domestic animals. Here, thymomata are discussed with regard to their incidence, morphology, histogenesis, classification and associated endocrine disturbances (the latter as yet recognized only in man).

Their apparent infrequency in domestic animals is attributed to errors in histological diagnosis of mediastinal tumours. Three types of purely epithelial nature (solid, reticular and cystic or glandular) and two forms of epithelio-lymphoid growth (epithelio-lymphoid and reticulo-lymphoid) are recognized.

From their study of normal and pathological material, the authors conclude that the thymic reticulum, corpuscles of Hassall, cysts, early thymocytes, epithelioid and myoid cells are of epithelial nature. They are willing to accept, however, the conception of an epithelio-mesenchymal metaplasia [desmoplasia of Kromayer] such as was favoured by Massen and Peyron.—J. W. Whittick.

Oppermann, M. (1939). Kleinhirn-Karzinom beim Pferde. [**Carcinoma of the Cerebellum in a Horse**].—*Dtsch. tierärztl. Wschr.* **47.** 473-475. 3 figs.

Peculiar nervous symptoms are described in a 9-year-old mare which had originally developed sudden severe lameness followed by spasm of the hind legs when returning from work.

Chief among these was an inco-ordinated gait, particularly of the hind limbs; a marked tendency to move to the right, and an unusual attitude when at rest, the head being tilted to the right and the body weight being thrown mainly on to the off fore limb. The left optic papilla had a pronounced red colour. Sensitivity was slightly heightened. The condition was afebrile and slowly progressive. While under observation the mare reacted on three occasions to the intradermal tuberculin test. She was finally destroyed.

Only the head was submitted to a pathologist. He reported the presence of a tumour, the size of a walnut, below the cerebellum. This was diagnosed histologically as a carcinoma arising from the choroid plexus. The rest of the carcass was examined by meat inspectors who found no obvious tuberculous lesions. —J. W. Whittick.

Andrewes, C. H., & Glover, R. E. (1939). **A Case of Neurolymphomatosis in a Turkey.**—*Vet. Rec.* **51.** 934-935. [3 refs.]

The authors describe progressive paralysis in a young turkey cock which was killed after 14 days illness, during which both legs and wings became involved. The spleen and liver were pale and enlarged. The right sciatic nerve was about 1 cm. in diameter at its junction with the cord, and the left sciatic and both brachial nerves were thickened, but to a lesser extent. The fibres of a portion of the vastus internus muscle appeared greyish white and glistening. The histological findings suggested neurolymphomatosis of the nerves and liver and chronic inflammation of the muscle.—C. V. Watkins.

Beach, J. R., & Twisselmann, N. M. (1939). **An Experimental Attempt to Produce Lymphomatosis in Chickens by Injections with *Salmonella aertrycke* and Lymphomatous Nerve Tissue, with Observations on the Blood Pictures of the Chickens.**—*Poult. Sci.* **18.** 160-164. 1 fig., 2 tables. [7 refs.]

Forty-eight chicks aged 47 days were divided into four equal groups; one group received intravenously 0·5 c.c. of a saline suspension of affected nervous tissue plus 0·5 c.c. of a saline suspension of *S. typhi-murium* orally per day for 50 days; the second group received intravenously 0·5 c.c. of nerve suspension, and the third 1·5 c.c. of *S. t.-m.* suspension daily for 50 days; the fourth group consisted of untreated controls.

The total number of cases of lymphomatosis which occurred amongst the experimental birds was relatively high (16) and was about equal in all four groups.

Numerous total and differential blood cell counts were made both on the birds which remained normal throughout the experiment, and on those which became affected with the disease. The numbers of abnormal and immature types of leucocytes encountered in blood films from those which remained normal were insignificant.

Blood films made from 12 of the 16 birds which developed lymphomatosis showed abnormalities, but the results were irregular. The changes most frequently encountered were as follows :– in six chickens there was a high total leucocyte count ; in seven, a low leucocyte count, and in three others the leucocyte counts were close to the lower normal limit ; in five there was a high count of polynuclears with rods, and in five others, a high count of polynuclears with granules. Myelocytes appeared in the blood of seven chickens. These were the only immature cells seen.

The blood findings were of no value in diagnosis, as, besides being irregular, changes only appeared at or about the same time as clinical symptoms.

The results of the experiment yielded no evidence that the intravenous inoculation of young chickens with lymphomatous nerve tissue or the repeated oral administration of cultures of *S. typhi-murium* either alone or in combination, causes the development of lymphomatosis, or produces a haemocytoblastosis or other change in the blood picture of the chickens.—L. E. Hughes.

NUTRITION IN RELATION TO DISEASE

Sen, K. C. (1937). **Congenital Blindness in Calves.**—*Proc. Anim. Husb. Res. Wkrs Conf. India, 1936.* pp. 33-35. Discussion pp. 35-36.

Datta [*V. B.* **5.** 149] published a resumé of the information available at Muktesar on the occurrence of a peculiar " blindness " in calves, with special reference to this condition as observed at the military Dairy Farm at Quetta. There appeared to be two forms of the disease, amaurotic and teratoma blindness. The question was whether they were of the same origin. Various possible theories concerning causation were studied, *e.g.* hereditary transmission, virus or bacterial infection etc.

Investigations concerning nutritional factors were carried out by Haddow and Sen in the Quetta dairy and in neighbouring districts. The chief nutritional faults found were, firstly, a lack of any green fodder for a large part of the year, and secondly, deficiency in phosphorus, though in the Quetta dairy this was compensated by feeding good concentrates. There was no marked imbalance in mineral content. Analyses of blood and sera showed no significant difference between animals which had given birth to blind calves and those which had not. Further investigations were considered to indicate that the disease, which started most probably during intra-uterine life, was not directly due to calcium or phosphorus deficiency. Vitamin A deficiency, alone or together with mineral deficiency, was considered.

In an attempt to produce the disease under controlled conditions, three groups of two cows each were kept on diets low in vitamin A, phosphorus, and calcium respectively. Although cows in the two latter groups lost condition and produced either aborted or non-viable calves, none of these was blind, but one calf was produced in which there was progressive blindness in the vitamin A deficient group, of the amaurotic type, essentially similar to that occurring naturally in Quetta.

It is stated that the provision of a liberal supply of green fodder has meanwhile eliminated the trouble at the Quetta farm.

McNaught, K. J., & Paul, G. W. (1939). **Seasonal Variation in Cobalt Content of North Island Pastures.**—*N.Z. J. Sci. Tech.* **21.** 95B-101B. 4 tables. [6 refs.] [Authors' summary copied *verbatim*].

(1) Samples of pasture taken at monthly intervals for twelve months from different localities in the North Island have been analysed for cobalt content.

(2) In general, over the period studied the cobalt content of the pastures tends to increase in late autumn and winter when growth is retarded, and decrease in spring and summer when growth is at its maximum.

(3) Under drought conditions cobalt increases.

(4) Tall or mature growth and hay tend to be lower in cobalt than closely-grazed pasture.

(5) Pastures from bush-sickness areas show a range in cobalt content according to the location, stage of growth, and season between 0·005 p.p.m. and 0·17 p.p.m. on dry matter; healthy pastures 0·04 p.p.m. to 0·37 p.p.m. or more. In areas where sheep are affected by cobalt deficiency the cobalt content of closely-grazed pastures, especially in late spring and summer, falls below about 0·08 p.p.m. and continues at a low level for several months.

STANTON, D. J., & KIDSON, E. B. (1939). **Cobalt Status of Soils and Pastures in the Sherry and Wangapeka Districts, Nelson.**—*N.Z. J. Sci. Tech.* **21.** 65B-76B. 2 figs., 2 tables. [5 refs.] [Authors' summary copied *verbatim*].

(1) A cobalt survey of the soils and pastures of the Tadmor, Sherry, and Wangapeka districts of the Waimea County, Nelson, has been made.

(2) The geological formations appear to influence considerably the cobalt content of the soils derived therefrom.

(3) Soils derived from Kaiteriteri granite in the Sherry, Dart, and Wangapeka valleys are low in cobalt, and in certain cases stock ailment is definitely associated with the grazing of stock on these soils.

(4) Low cobalt content of soil is generally associated with low cobalt figures for the pastures growing thereon.

(5) Cobalt contents of pastures do not always show a correlation with corresponding figures for the soil samples.

MAREK, J., WELLMANN, O., & URBÁNYI, L. (1939). Epiphysenlösung im Femurkopf bei einem jungen Pferd auf rachitischer Grundlage. **[Separation of the Epiphysis from the Head of the Femur in a Rickety Foal].**—*Dtsch. tierärztl. Wschr.* **47.** 353-356.

After eleven months on an experimental diet of high P_2O_5 content and negative " Erdalkali-alkalizität " value [*V. B.* **1.** 261], an eighteen-month-old foal sustained gross injury involving complete separation of the epiphysis from the head of the right femur. Detailed clinical, P.M., histological and biochemical observations established the presence of a skeletal disease designated as rickets in accordance with the views of these authors. A second foal remained in sound health on a diet with positive "E.-A." value and a $CaO : P_2O_5$ ratio of 1:16. The rickets-producing action of a diet of high P_2O_5 content and negative " E.-A." value is thus confirmed and the evidence on this point in the case of swine, ruminants and solipeds is now considered by the author to be complete.

The authors suggest that enzootic equine osteofibrosis is basically a rachitic disease, but as the true rachitic lesions are accompanied by fibrotic changes in the marrow, it is considered possible that the disease can develop into osteodystrophia fibrosa.—W. R. MUIR.

VERSTRAETE, A., & CLOETENS, R. (1938). Onderzoekingen over de veranderingen van het anorganisch phosphaatgehalte van het in vitro bewaard serum van rachitische honden. [*In vitro* **Changes in Inorganic Phosphate in the Serum of Dogs with Rickets**].—*Vlaam. Diergeneesk. Tijdschr.* **7.** 325-333. 1 graph. [7 refs.] [English, French and German summaries.]

It was found that when the serum of untreated dogs affected with rickets was

kept for ten days at 37°C. in the presence of toluene, the inorganic P tended to rise slowly to about 2 mg.% above the initial value. The serum of dogs which had been treated with ultra-violet rays or vitamin D showed the same variation. [This work has no practical significance: the rise in P is due to chemical changes in the serum resulting in transformation of some of the organic P into inorganic P.—Ed.]—A. W. Möller.

Meisters, N. (1938). Puerperale Stoffwechselkrankheiten. Krankheiten der Mutterschweine. III. Mitteilung. [**Puerperal Metabolic Diseases in Sows. III**].—*Dtsch. tierärztl. Wschr.* **46.** 584-586. 2 tables. [2 refs.] [For part II see *V. B.* **9.** 175].

Sows, immediately after farrowing, sometimes suffer from a disease resembling milk fever in cattle. The chief symptoms are loss of appetite, disinclination to rise, constipation and a reduced milk yield, but normal temperature. Blood analyses were made in a number of cases. A slight reduction in serum P and Ca was noted but, since normal sows 8-55 hours after farrowing also showed the same changes, these findings could not be considered significant and the condition is not identical to milk fever. Treatment consisted in the injection of pilocarpine and caffeine, together with the administration of calcium salts; good results were obtained. Attention should be paid to the diet of sows during pregnancy and skim-milk should be replaced by whole.—J. A. Nicholson.

I. Jespersen, J. (1938). Der Einfluss der Ernährung auf die Konstitution der Schweine und die Konstitution in Zusammenhange mit dem Hämoglobinprozent. [**Influence of Nutrition on the Condition of Swine, and Constitution in Relation to the Haemoglobin Ratio**].—*Rep. 13th int. vet. Congr. 1938.* **2.** 901-909. [In German: English, French and Italian summaries. Discussion pp. 921-924 in English, French and German].

II. Bečka, J. (1938). Der Mineralmetabolismus, seine Bedeutung in der Therapie und in Bezug auf Leistungsfähigkeit. [**Significance of Mineral Metabolism in Therapeutics and for Productivity**].—*Ibid.* 910-920. [14 refs.] [In German: English, French and Italian summaries. Discussion pp. 921-924 in English, French and German].

III. Wellmann, O. (1938). Wesen und Bedeutung des Mineralstoffverhältnisses im Futter mit Rücksicht auf die Kalk- und Phosphorversorgung des Tierkörpers. [**Importance of Mineral Content of Diet with Regard to the Calcium and Phosphorus Supply**].—*Ibid.* 1238-1255. [In German: English, French and Italian summaries. Discussion pp. 1275-1281 in French, German and Italian].

IV. Sjollema, B. (1938). Physiologische Grundzüge für die Ernährung der Haustiere. [**Physiological Basis for Animal Nutrition**].—*Ibid.* 1256-1266. [In German: English, French and Italian summaries. Discussion pp. 1275-1281 in French, German and Italian].

I. Experiments to show the influence of nutrition on the constitution of pigs have been carried out in Denmark continuously since 1880. Pigs weighing 20-90 kg., divided into groups of ten, are distributed to various parts of the country so that the influence of environment can be studied at the same time. It has become clear that feeding a diet of poor biological value, *e.g.* bran or tapioca-meal, produces unthriftiness, anaemia, diarrhoea and eczematous conditions of the skin. In extreme cases death may follow. The animals can be restored to health simply by the addition of calcium carbonate and sodium chloride to the diet. Particular attention has been paid to the haemoglobin content of the blood. At birth this is usually between 55% and 65%, but on poor diets it may fall very

rapidly to as low as 20% and there is good evidence to suggest that anaemic animals are very susceptible to tuberculosis and other affections of the lungs.

II. It is now unquestioned that inorganic salts are essential for the proper metabolism of all the substances in the body. They are present in the ionized form, as undissociated complex compounds and in the colloidal state, and are used in every phase of cellular activity. Inorganic colloids are very important, either alone or combined with organic colloids, but up to the present insufficient attention has been paid to them.

The four chief factors governing mineral metabolism are (1) the salts themselves, which may be regarded as automatic regulators, (2) physical conditions such as heat and light, (3) chemical reactions, including those controlled by enzymes or vitamins, and (4) physiological conditions. When given by the mouth salts often have a different action than when given by injection. This is probably due to reactions taking place in the alimentary canal. Sodium salts have the same action when injected or given by the mouth, which indicates that they are readily absorbed. The action of salts in the body can be roughly divided into alkalizing or acidifying ; salts with an acidifying action increase excretion of calcium and to a lesser extent that of phosphorus also. As a regulator for calcium and the pH, the parenteral administration of colloidal magnesium hydroxide has been successfully used. It is indicated for use in such diseases as osteomalacia, rickets, haemoglobinuria and oxalate poisoning. There is also some evidence to show that it may increase the resistance of the animal against infectious diseases.

III. Two of the most important inorganic salts are Ca and P, and their availability and utilization are affected by a large number of factors such as the nature and composition of the food, the chemical reactions which take place in the alimentary canal and the acid-base equilibrium. The Ca/P ratio is affected by a large number of factors, for example an excess of Ca in the food produces a P want, Fe and Mn disturb the ratio by combining with the P, and Mg salts do so by assisting the absorption of Ca. There is evidence to show that the protein, fat, carbohydrate and crude fibre content of the food must also be taken into consideration. Thus simple Ca and P determinations do not give a sufficiently clear picture of the value of a food, and the question arises as to how the content in the food of these salts should be expressed.

W. considers that a determination of the alkalinity due to alkaline earths per 100 g. dry matter, *i.e.* the mg. equivalents of CaO plus MgO minus P_2O_5 per 100 g. dry matter, is a better way of expressing the mineral value of a food than a Ca/P ratio. It is concluded that for a diet to be adequate not only must Ca and P be present in adequate amounts, but also, however it may be expressed, the proportions of the two salts present must balance. If either is deficient or if they do not balance vitamin D must be added to the diet.

IV. The chief functions of inorganic salts in the body are for the control and regulation of the velocity of metabolic processes, for the maintenance of the chemical and physico-chemical conditions of the body fluids necessary for cellular activity, for the formation of new tissue etc., and for energy production. Enzymes, vitamins and hormones are so intimately connected in the catalytic systems of the body that it is impossible to separate them. Moreover many enzymes, vitamins and hormones contain inorganic salts which must be provided in the food, and it is not yet fully established how many or which of these different substances can be manufactured in the body.

Sodium is perhaps the most important element for maintaining the correct osmotic pressure of the body fluids, and estimations have shown that, during growth, young pigs, calves and chickens require 0·5% Ca, 0·4% P and 0·15% Na per

100 g. dry matter. When growth ceases half these quantities is sufficient. During the last months of pregnancy more Ca and P are required, and for milk production 2·5 g. Ca and 2·25 g. P per kg. milk are necessary.

Incorrect nutrition is responsible for a great deal of disease and loss, and the question should be carefully studied by all veterinarians.—J. A. NICHOLSON.

BROUWER, E., FRENS, A. M., REITSMA, P., & KALISVAART, C. (1938). Onderzoekingen over de Z.G. diarrhoeweiden (" scouring pasture ") in den wieringermeerpolder. [**Diarrhoea in Cattle on Reclaimed Land in Holland**]. —*Versl. Ned. Landb. Onderzoekingen No. 44 (4) C.* pp. 267-298. 2 figs. on 1 plate, numerous tables, 1 chart. [Numerous refs.] [English summary].

Deals with a form of persistent diarrhoea in heifers and cows in recently drained areas in the Zuyder Zee. This condition is reminiscent of the disorder known as " teart " occurring on the lower Lias formation in Somerset [*V. B.* **7.** 296.], and on areas of " Oxford clay ". Feeding experiments showed that a mixture of 1 g. copper sulphate and 0·2 g. cobalt nitrate given three times a week was successful in preventing and curing the diarrhoea. Copper sulphate alone was almost as effective. A salt mixture containing Cu, Co, Mn, Zn, As, Ni, Mo and B was no better than the mixture of Cu and Co.—H. H. GREEN.

SURE, B., KIK, M. C., BUCHANAN, Kathryn Sue, HARRELSON, R. T., Jr., & THEIS, R. M. (1939). **Biochemistry and Pathology of Avitaminosis. III. Enzymic Efficiency in Deficiency Diseases.**—*Bull. Ark. agric. Exp. Sta.* No. 373. pp. 20. 11 tables. [17 refs.] [For part II see *V. B.* **9.** 844].

Summarized data are given of the influence on the albino rat of certain avitaminoses (A, B_1, B complex, B_2 and D) on the concentration of the following blood and tissue enzymes :– pepsin, trypsin, erepsin ; pancreatic amylase, lipase and esterase ; liver lipase and esterase ; blood serum amylase, esterase and phosphatase ; and kidney phosphatase.

The results indicated that in vitamin A deficiency there was a decrease in the concentration of blood serum and liver esterases and an increase in liver lipase. In vitamin B_1 deficiency the decrease in pancreatic esterase and in pancreatic and liver lipase indicated a disturbance in the fat metabolism. With polyneuritis there was no additional influence on the enzyme concentrations. Repeated vitamin B_1 depletions resulted in a reduction in efficiency of peptic digestion.

No noteworthy changes were observed in the vitamin D deficiency groups, nor was the blood serum phosphatase increased even in cases of rickets, but avitaminosis of B complex did cause increase in the concentration of this enzyme. Vitamin B_2 deficiency produced no significant effect on the concentration of blood and tissue enzymes.

The authors suggest that in spite of the general belief that vitamin deficiency causes a great loss of digestive efficiency the results of these studies show that only B_1 avitaminosis caused a definite metabolic disturbance.

The methods used for the estimations of the enzyme activities are briefly described.—R. ALLCROFT.

ENGEL, R. W., & PHILLIPS, P. H. (1938). **The Lack of Nerve Degeneration in Uncomplicated Vitamin B_1 Deficiency in the Chick and the Rat.**—*J. Nutrit.* **16.** 585-596. 2 tables. [Numerous refs.] [Authors' summary copied *verbatim*].

1. The administration of β-carotene or percomorph oil together with riboflavin removed all evidence of pathology in the peripheral nerves of vitamin B_1 deficient chicks or chicks fed an adequate ration at a restricted level of intake.

2. Neuropathology was seldom observed in a rat on a vitamin B_1 deficient but otherwise adequate ration.

3. Recovery from B_1 deficient symptoms in the rat by the administration of crystalline vitamin B_1 produced a marked histologic reaction in the liver.

4. It is concluded from these studies that uncomplicated beriberi is not accompanied by peripheral nerve degeneration.

DANN, W. J., & SUBBAROW, Y. (1938). **Differentiation of the Rat Dermatitis Factor and the Chick Dermatitis Factor from Nicotinic Acid.**—*J. Nutrit.* **16.** 183-195. 4 tables. [Numerous refs.] [Authors' summary copied *verbatim*].

Data are presented to show that nicotinic acid will not cure rat dermatitis or prevent chick dermatitis, and it is concluded that vitamin B_6 and the filtrate factor are both distinct from nicotinic acid.

The finding of ELVEHJEM *et al* (loc. cit.) [*V. B.* **9.** 108.] that nicotinic acid will cure blacktongue in dogs has been confirmed.

These results are regarded as affording direct evidence that the vitamin B_2 complex contains the following four different, sharply characterized entities: riboflavin, nicotinic acid, vitamin B_6 and the filtrate factor.

DANN, W. J. (1939). **The Possible Clinical Significance of Factors of the Vitamin B_2 Complex other than Nicotinic Acid.**—*Amer. J. trop. Med.* **19.** 219-227. [Numerous refs.]

A short review of riboflavine in the rat, chick, turkey poult and dog, of vitamin B_6 in the rat and crude liver extracts and the filtrate factor in the chick, leads to speculations on possible clinical applications of crude preparations of the complex. (1) The crude preparation may be useful in certain liver disorders. (2) The health of the skin of rats, chicks and human beings affected with pellagra is seen to be affected by this complex. Preparations of factors B_6 and H have been reported successful in treating exfoliate dermatitis and psoriasis. The facts suggest that some essential role is played in all the species by some complex involving all the factors. Specific differences may be due to variations in the complex composition or in efficiency of absorption or utilization. (3) The relation of B_2 to anaemia in human beings, dogs, pigeons, rats and monkeys also indicates that the crude drug should be used, as a number of inter-related factors are involved.—E. J. McD.

I. LANSING, A. I., MILLER, D., & TITUS, H. W. (1939). **The Formation of Erosions of the Gizzard Lining in the Young Chick.**—*Poult. Sci.* **18.** 475-480. 7 figs. [10 refs.]

II. BLOUNT, W. P. (1939). **Observations and Experiments on Gizzard Erosion in Poultry.**—*Vet. J.* **95.** 301-313. 3 plates. [14 refs.]

I. Gross observations were made on approximately 7,000 chicks from a few hours to a few weeks old. Microscopic examination of 30 abnormal gizzards of chicks one or two days old revealed the following changes:—(1) Infiltration of blood cells from submucosal capillaries into the glandular layer and subsequent mixing of the blood cells with the secretion which eventually "solidifies" and becomes the gizzard lining. (2) A large number of cases in which there were pronounced haemorrhages from the glandular layer and accumulations of blood between the lining and the glandular layer. (3) Anaplasia of the epithelial cells of the glands. (4) Reduction in quantity of cytoplasm in the epithelial cells near the bases of the crypts.

From these observations it is concluded that haemorrhages from the glandular layer originating from the capillaries in the submucosa are the immediate cause of gizzard erosion.

II. Following a brief review of the literature dealing with this subject, a description is given of the histological appearance of the healthy gizzard, and the most important pathological changes observed in cases of gizzard erosion.

A number of experiments on chicks showed that a standard mash used successfully for the production of table poultry did not give protection against gizzard erosion when intensive rearing conditions were employed, nor did a ration containing 20% bran, 12·5% alfalfa and 3% dried grass powder; this result was somewhat contrary to the findings of ALMQUIST and STOKSTAD [*V. B.* **9.** 108]. Dried yeast appeared to accentuate the condition. Since only a portion of the chicks in any batch were affected it is presumed that varying amounts of the anti-gizzard erosion factor were inherited *via* the yolk sac. No correlation was observed between body weight, gizzard weight, gizzard weight/body weight ratio, and the number or degree of lesions. Although some cases of erosion may be associated with mechanical causes and others related to fungous infections of the crop (thrush), the vast majority are thought to be due solely to an absence or inhibition of the specific nutritional gizzard erosion preventive factor, and it is concluded that the disorder is probably of widespread occurrence throughout Great Britain in numbers of intensively reared chicks aged 2-8 weeks.—R. ALLCROFT.

I. HUGHES, D. L. (1938). **The Relation of Capillary Fragility to the Purpuras.** —*Vet. Rec.* **50.** 1805-1806. [6 refs.]

II. ANON. (1938). **What is Vitamin P?**—*Brit. med. J.* Dec. 3rd. 1152-1153. [9 refs.]

I. An annotation dealing with the identification of vitamin P, and with the utilization of vitamin P preparations in the treatment of purpuric haemorrhages and other conditions. H. considers that vitamin P therapy has probably been justified in the case of purpuras in which the local lesion is mainly one of defective capillary resistance, and suggests that similar treatment might be given a trial in the purpuras of animals which are associated with acute fevers.

II. A brief review of the discrepancies in the published results of various investigators, namely SZENT-GYÖRGYI and his co-workers, ZILVA, BENTSATH and LOTZE. It is concluded that: " at present . . . it seems to be less a question of whether vitamin P really exists than of what vitamin P really is."—A. N. WORDEN.

PUBLIC HEALTH

SEEKLES, L. (1939). Over het gebruk van indicator-papier voor de bepaling der pH van urine, faeces, voedings-bodems bacteriologisch onderzoek, melk, vleesch en vleeschextract. [**The Use of Indicator Papers for Determining the pH of Urine, Faeces, Bacteriological Media, Milk, Meat and Meat Extract**].—*Tijdschr. Diergeneesk.* **66.** 910-933. 12 tables. [English, French and German summaries].

Comparison of pH determinations with the glass electrode and with graded indicator papers (commercial " Hyphan " series) were made on 342 samples of different natures, including urine of men and animals, milk, culture media, faeces, beef and beef extracts. In the case of beef the test paper was laid on a freshly cut surface. The results obtained with indicator paper were generally lower than those determined electrometrically, the error being about 0·2 pH for urines, up

to 0·6 pH for certain culture media containing serum, and even as high as 1·2 pH for alkaline milk. The usefulness of the approximations obtained by using graded indicator papers therefore, presupposes a knowledge of the nature of the material tested.—H. H. Green.

I. Nieberle. (1938). Die Beurteilung tuberkulöser Schlachttiere. [**Meat Inspection Decision on Tuberculous Slaughter Animals**].—*Rep. 13th int. vet. Congr. 1938.* **2.** 1062-1071. [In German. Discussion pp. 1097-1011 in German].

II. van Oyen, C. (1938). Die Beurteilung tuberkulöser Schlachttiere. [**Meat Inspection Decision on Tuberculous Slaughter Animals**].—*Ibid.* 1072-1086. [In German: English, French and Italian summaries. Discussion pp. 1097-1011 in German].

III. Cesari, E. (1938). L'appréciation des bêtes de boucherie tuberculeuses. [**Meat Inspection Decision on Tuberculous Slaughter Animals**].—*Ibid.* 1087-1096. [In French: English, German and Italian summaries. Discussion pp. 1097-1011 in German].

I. The greater part of this paper summarizes the contributions made by N. and others in recent years to the elucidation of the pathogenesis of TB. in cattle. This information can be obtained from articles previously abstracted in the *V. B.* Of special importance in meat inspection are " Niederbruchsformen ", *i.e.* cases in which chronic tuberculous lesions in a particular organ (lung, udder, kidney, uterus) suddenly develop into rapidly extending caseating lesions with resulting haematogenous spread and widespread miliary TB. In such cases it was often possible to demonstrate a tuberculous bacillaemia in histological sections, tubercle bacilli being seen within the lumen of relatively large blood vessels in the lung and liver. The macroscopic feature of this type of TB. is diffuse, dry caseous areas showing numerous minute haemorrhages, with an infiltrating caseous lymphadenitis of the regional lymph nodes.

TB. of lymph nodes draining the musculature (Fleischlymphknoten) occurs only during early generalization of the disease and the finding of tuberculous lesions in this site indicates previous generalized infection during which some of the bacilli reached the lymph node by the blood stream. In such cases it is suggested that the bones of the affected quarter or, preferably, of the whole carcass, should be examined for the presence of tuberculous lesions.

A summary of the paper and suggested recommendations for meat inspection are given at the end of the paper by van Oyen and represent the opinions of both authors.

II. The recommendations relating to meat inspection suggested by the author apply to countries in which meat intended for consumption is divided into two classes, " sound " and " conditionally sound ". Meat of the latter class is sterilized before sale.

In the great majority of cases the meat inspector has to decide the fate of a given carcass on a basis of the visible tuberculous lesions; there are, however, occasional cases in which tissues which are macroscopically normal (musculature) contain viable tubercle bacilli. These are the " Niederbruchsformen " described by Nieberle [see I]. In suspicious cases the diagnosis should be confirmed by the examination of frozen sections of liver and kidney and the finding of early miliary and submiliary tubercles.

Summary :–

1. The whole carcass is to be condemned in cases of generalized TB. of the musculature, advanced emaciation, oedema or absence of *rigor mortis*.

2. In other cases the carcass should be classed as " conditionally sound ". These cases comprise :–

(*a*) Primary lesion followed by early generalization with local miliary TB. in certain organs.

(*b*) Acute miliary TB. of the lungs ; the kidneys are usually involved and the liver shows submiliary tubercles on histological section.

(*c*) " Niederbruchsformen ", *e.g.* caseous mastitis, pneumonia or nephritis of the type described in the paper.

(*d*) Incompletely developed " Niederbruchsformen " with miliary TB. of the lungs, kidneys, liver and muscle lymph nodes.

3. In cases not falling into either of the above classes the whole carcass is to be considered sound except in so far as the following conditions do not apply :–

(*a*) Tuberculous organs are unsound. An organ free from macroscopic TB. is to be considered tuberculous if its lymph node is affected.

(*b*) The whole of the skeleton is to be condemned in cases of involvement of bones, joints or tendons.

(*c*) If there exists TB. of a lymph node draining the musculature, all such nodes must be inspected and the affected quarters removed. The bones should be examined for lesions and condemned if affected.

4. If the mesenteric nodes show evidence of TB. all such nodes, together with the stomachs and intestines, should be condemned. The mesenteric and omental fat is to be classed as " conditionally sound ", *i.e.* to be rendered down before being sold.

5. In cases of serosal TB. proceed as follows :–

(*a*) If the visceral surface is involved, the serosa is to be stripped and the fat rendered down.

(*b*) If the lesions involve the parietal serosa this may be stripped and the exposed surface seared.

6. Localized TB. of the musculature is to be treated as a local lesion, *i.e.* the affected tissue to be condemned.

III. The paper contains no information of importance and consists of a criticism of the papers by Nieberle [see I] and van Oyen [see II] on the ground that there is not sufficient available knowledge to justify any attempt to change the regulations at present in force in meat inspection. Although admitting that beef might on occasion contain viable tubercle bacilli, C. states that the danger to the consumer of eating such meat is not known. [It must be remembered that the proposals of Nieberle relate to a country where much raw and partly cooked meat is consumed ; also, that meat exposed for sale is usually required to be " sound " and not merely " safe "].

A joint discussion was held on the three papers. Meyn, who carried out the bacteriological work mentioned by Nieberle, gave the details of his technique for estimating the number of viable tubercle bacilli present in samples of meat. The juice extracted from 10 g. of muscle, after treatment with HCl, was sown on Petragnani's medium. The number of colonies obtained from 1 g. of meat varied from 1 to 85 ; the actual number of organisms present would for obvious reasons have exceeded the number of colonies. As a rule the number of colonies obtained was less than was obtained from comparable amounts of tuberculous lesions. Similar experiments using 10 c.c. of tuberculous milk gave very varied results ; in a few samples tubercle bacilli could be demonstrated only by g. pig inoculation. So long as the degree of infection of milk or meat which is dangerous to man remains unknown, the consumption of either in the raw state should be prevented.

—E. G. White.

Ehrlich, C. (1939). Untersuchungen über die Feststellungen von Milcheiter. **[The Demonstration of Pus in Milk].**—*Z. Fleisch- u. Milchhyg.* **49.** 274-279 and 289-293. 3 figs., 5 tables. [Numerous refs.]

Taking the sediment to be indicative of the extent of pus cells, samples of milk in 25 c.c. Trommsdorff tubes were spun in a milk-fat centrifuge. Results were compared with those obtained by the bromthymol blue test and by microscopic methods. A sediment of more than 0·4 per thousand usually indicated abnormality. Detection of pus in bulk samples could be followed up by simpler methods (dish test, bromthymol blue reaction) to detect the cows responsible. The method was not deemed practicable for commercial bulk milk samples, for which the microscopic method is recommended. E. uses a 2 mm. loop of sediment from 10 c.c. of milk, mixed with two loops of saline and spread evenly over a surface of 3 sq. cm. An average of over 60 leucocytes per field (Leitz binocular 5xB, oil-immersion 1/12) was regarded as a high cell count. If, in addition, mastitis streptococci were seen, then the milk could be said to contain " microscopically demonstrable pus ". The sale of such milk for drinking purposes is prohibited, but after centrifuging and heating it could be used for the preparation of milk products. 13-14% of commercial milk fell into this classification. Mastitis streptococci could be distinguished from souring streptococci, which were common, by their uneven distribution and tendency to an intracellular position. Raw milk gave a much smaller cell count in sediment than did heated milk.—H. E. Harbour.

THERAPEUTICS

Ojemann, J. G. (1938). Prontosil bij ziekten van kleine dieren. **[Prontosil in the Diseases of Small Animals].**—*Tijdschr. Diergeneesk.* **65.** 885-888. [English, French and German summaries.]

It is claimed that the intravenous injection of 0·5-5 c.c. of a 5% solution followed by 1-2 tablets of prontosil album daily for 2-3 days yielded good results in early cases of distemper. 1-2 c.c. of red prontosil given subcutaneously with 0·5 c.c. of lentin (Bayer) gave good results in the treatment of pseudo-membranous enteritis of cats. O. had bad results when he treated pneumonia, old cases of distemper, and diseases of the nervous system with prontosil. In Weil's disease the results were doubtful.—A. W. Möller.

Rimington, C., & Hemmings, A. W. (1939). **Porphyrinuric Action of Drugs Related to Sulphanilamide. Comparison with Reported Toxicity, Therapeutic Efficiency and Causation of Methaemoglobinaemia. Definition of the Structure Responsible for Porphyrinuric Action.**—*Biochem. J.* **33.** 960-977. 2 tables, 1 appendix. [Numerous refs.]

Increased porphyrin excretion in the urine was found in rats on a standard diet following dosing with a variety of sulphanilamide derivatives and simpler compounds with related groups. The general conclusions drawn are:–(1) there is no relation between therapeutic efficiency and porphyrinuric action ; (2) the latter runs parallel with general toxicity ; (3) those substances causing porphyrinuria are capable of producing methaemoglobinuria *in vivo*, and (4) the increase in porphyrinuric action depends upon the pressure of an aromatic amino group, unsubstituted or potentially free, and preferably situated in such a system that it is capable of undergoing oxidation with the formation of a hydroxylamine derivation or a reversibly oxidising system such as a *p*- or *o*- imino quinone.

There is evidence supporting the hypothesis that sulphanilamide and its derivatives may to some extent undergo oxidation at the amino group *in vivo*. It is suggested that the extra porphyrin excreted is derived from an increased breakdown of blood pigment, that the methaemoglobin when formed is degraded, not to bile pigment, but to porphyrin and that haematin is possibly one of the intermediate stages in this transformation.—Alfred Eden.

Werner, A. E. A. (1939). **Estimation of Sulphanilamide in Biological Fluids.** —*Lancet.* **236.** 18-20. 6 tables. [9 refs.]

A new method for the estimation of sulphanilamide and derivatives in blood and urine is described, depending upon the reaction of sulphanilamide with Ehrlich's reagent (p-dimethyl-amino benzaldehyde) giving instantaneously a yellow colour. A preliminary hydrolysis is necessary when the total amount of the drug is to be estimated in urine and blood where sulphanilamide is found to be partly conjugated as the acetyl derivative. Comparison may be made colorimetrically with standard amounts of sulphanilamide similarly treated, or for rough clinical purposes the colour may be matched against a standard 1 % $KCrO_4$ solution diluted according to the directions given. For fuller details of the method the original should be consulted.—Alfred Eden.

I. Birkhaug, K. (1939). **Treatment of Experimental Tuberculosis with Sulphonamide.**—*Brit. med. J.* July 8th. 54-57. 2 tables, 6 graphs. [19 refs.]

II. Anon. (1939). **Chemotherapy in Tuberculosis [Sulphonamide].**—*Ibid.* 73-74.

I & II. Careful examination of the growth rate, the conditions of the blood and the lesions found P.M. were made in experimental and control groups of g. pigs. It was found that the daily parenteral administration of sulphonamide (as " prontosil soluble Bayer ") seemed to exert a significant inhibitory action on the development of infection of g. pigs with bovine tubercle bacilli. This inhibitory action appears to be referable to the *in vivo* bacteriostatic effect of sulphonamide on the growth of the tubercle bacillus. It is pointed out that the experimental infection in the g. pig produces an acute attack, and that the results obtained in such experiments would not necessarily be of significance in relation to the chronic infection in the human subject.—J. M. Robson.

I. Rist, N. (1939). Action du p-aminophénylsulfamide et de la p-diaminodiphénylsulfone sur la culture des bacilles tuberculeux des mammifères et des oiseaux. [**Action of p-Aminophenylsulphamide and of p-Diaminodiphenylsulphone on the Culture of Mammalian and Avian Tubercle Bacilli**]. —*C. R. Soc. Biol. Paris.* **130.** 972-975. [8 refs.]

II. Rist, N., Bloch, F., & Hamon, V. (1939). Action inhibitrice du p-aminophénylsulfamide et de la p-diaminodiphénylsulfone sur la multiplication *in vivo* d'un bacille tuberculeux aviaire. [**Inhibiting Action of p-Aminophenylsulphamide and p-Diaminodiphenylsulphone on the Growth of Avian Tubercle Bacilli** *in vivo*].—*Ibid.* 976-980. [14 refs.]

I. An investigation was made of the action of these drugs on the growth of tubercle bacilli *in vitro*, both on surface and on deep growths. p-Diaminodiphenylsulphone (1158 F) was found to be most effective in inhibiting growth, and in some cases an inhibition was produced by a concentration of 1 mg. per 100 c.c. of medium. p-Aminophenylsulphamide (1162 F) was found to inhibit the growth of tubercle bacilli in concentrations about ten times larger than 1158 F.

II. Rabbits and g. pigs were injected intravenously with large doses of avian tubercle bacilli, which produce an acute reaction ; large numbers of bacilli are found in the liver and spleen. By counting the organisms, quantitative values for the intensity of the infection can be obtained. By using this method it was found that subtoxic doses of both drugs, introduced into the stomach by means of a tube or given by injection, produce an inhibition of the growth of the bacilli *in vivo*.—J. M. Robson.

Richou, R., & Rastegar, R. (1939). Les résultats immunologiques des injections associées d'anatoxine tétanique et de sulfamide chez le lapin. [**The Immunological Effects of Simultaneous Injections of Tetanus Anatoxin and Sulphamide in Rabbits**].—*C. R. Soc. Biol. Paris.* **131.** 856-857. [1 ref.]

Estimation of the antitoxic titre of the sera of four groups of five rabbits which had received two intravenous injections of tetanus anatoxin, with or without simultaneous intravenous or subcutaneous injections of sulphamide solution, or of an anatoxin-sulphamide mixture, demonstrated that sulphamide had no effect on the immunizing properties of the anatoxin.—R. O. Muir.

I. Cantarow, A., Stewart, H. L., & Morgan, D. R. (1938). **Experimental Carbon Tetrachloride Poisoning in the Cat. I. The Influence of Calcium Administration.**—*J. Pharmacol.* **63.** 153-172. 1 fig., 4 tables. [9 refs.]

II. Stewart, H. L., & Cantarow, A. (1938). **Experimental Carbon Tetrachloride Poisoning in the Cat. II. The Influence of Ligation of Single Bile Ducts.**—*Arch. Path.* **26.** 1121-1130. 2 tables. [Numerous refs.]

I. Adult cats, maintained on a diet of fresh meat and milk, received 0·25-0·3 c.c. of CCl_4 per k.g. body weight. Estimations of bromsulphalein retention, serum bilirubin, and blood non-protein nitrogen were made. Before sacrifice by bleeding under light anaesthesia, 5 c.c. of Indian ink (1:4 dilution in normal saline) was injected intravenously. The animals were divided into two groups and those in group 2 received, in addition to the above, 2 c.c. of a 10% solution of calcium gluconogalacto-gluconate intravenously at the time of the administration of the CCl_4 and every subsequent 24 hours.

The mortality in group 1 was 33·3%. The morphological findings are described and of particular interest are the recrudescence of regressive phenomena during the 3rd and 4th weeks and the impairment of Kupffer cell function during the first six days.

The mortality in group 2 was 16·6% and in this group there was less clinical evidence of toxaemia, less disturbance of hepatic function, and less hepatic cell disintegration ; the hepatic cell cord arrangement was better preserved, congestion and inflammatory cell infiltration of the central zones were less marked and the functional activity of the Kupffer cells was better maintained.

The findings suggest that the administration of calcium was of benefit in acute CCl_4 intoxication in the cat.

II. The material and methods were as in I except that no calcium was given. In group 2 one or more ducts from the left lobe were doubly ligated and divided. Seven of the cats died within nine days as a result of the operation, and the surviving ten each received subcutaneously 0·3 c.c. CCl_4 per kg. body weight 14 days after ligation.

During the first six days after CCl_4 administration liver changes in cats of group 2 were less marked than those in group 1 ; there was comparatively little evidence of cellular degeneration, atrophy, or compression. On the sixth day the liver appeared essentially normal, whereas in group I there was evidence of extensive

residual damage. Kupffer cells were actively functioning throughout obstructed lobules, whilst in group 1 those few Kupffer cells which were active were located peripherally in the lobules.—R. BAMFORD.

LANGER, F. (1939). Uber die Erfahrungen mit Congasin (Prüfungsname Hoechst 6678, Surfen C) bei der Infektion der Pferde und Rinder mit *Trypanosoma congolense* und *vivax* in Afrika. [**Treatment of** *Tryp. congolense* **and** *Tryp. vivax* **Infection in Horses and Cattle with Congasin (Hoechst 6678, Surfen C**].—*Vet. med. Nachr. Bayer-Meister Lucius.* No. 3. pp. 45-53.

An account of the use of the drug mentioned in the title. The information has been given in previous abstracts in the *V. B.*—A. L. WILSON.

BELLE, G. (1938). La rétention chlorurée consécutive aux injections de naganol. [**Chlorine Retention after Naganol Injections**].—*Maroc méd.* **18.** 345-346. 2 figs., 5 tables. [1 ref.]

After administering naganol to four horses, it was found that the chlorine excreted by the urine decreased below the normal average, but when the dose of naganol was increased, the chlorine output rose, though it never reached the normal figure. This decreased chlorine output occurred only in the first few days after naganol administration, and never extended beyond the fourth day. The retention of chlorine is ascribed to the action of the drug on the kidneys, whilst the fact that a large dose increased the chlorine output is ascribed to the influence of the drug in lowering the level at which chlorides pass from the blood to the urine.—U. F. R.

LAVRENT'EV, P. A. (1938). Opyt lecheniya theilerioga krupnovo rogatovo skota piroplazminom. [**Treatment of Bovine Theileriasis with Piroplasmin**].—*Trud. Uzbek. nauchn.-issled. vet. Stan., Tashkent.* **10.** 69-76. [9 refs.] [English summary].

" Piroplasmin ", a Russian preparation stated to be identical with acaprin, was tested by L. for its curative effect on theileriasis of cattle, with entirely negative results.—E. MARTIN.

BLOUNT, W. P. (1938). **New Arsenical Preparations in the Treatment of Blackhead in Turkeys.**—*Vet. J.* **94.** 344-347.

An account of the use of Mapharside (P.D. & Co.) to show that the application of flock treatment results in reduced losses. Three instances of its use are recorded ; in one case 21 birds, the remainder of 50, were treated and only three more deaths occurred ; in another case, where five birds out of 100 had been lost, only one of the remaining 95 died after being treated ; and in the third case, where 60 birds were treated, three deaths took place.—W. J. IRONSIDE.

DICKINSON, E. M., & SCOFIELD, R. H. (1939). **The Effect of Sulphur against Artificial Infection with** *Eimeria acervulina* **and** *Eimeria tenella.*—*Poult. Sci.* **18.** 419-431. 2 tables, 7 graphs. [4 refs.]

Flowers of sulphur was fed in the ration to birds of different ages with a view to finding whether it afforded protection against inoculated pure cultures of *Eimeria acervulina* and *E. tenella.* The effects of treatment were estimated by noting any variations in body weight and food consumption, clinical evidence, mortality and egg production. No marked success was achieved by the use of sulphur one week before or after the administration of massive doses of *E. acervulina* although mortality only occurred amongst the youngest group of birds used. When a further massive dose was given there were no indications of a resistance

induced by the first dose. Sulphur gave protection against *E. tenella* infection, but the treated birds later proved highly susceptible to subsequent massive doses. Inoculated controls which had developed acute *E. tenella* infection were rendered immune to the effects of subsequent large doses.—C. Horton Smith.

Chand, K. (1939). **The Effect of Certain Drugs and Mineral Deficiencies on Helminthiasis of Ruminants.**—*Indian J. vet. Sci.* **9.** 267-278. 1 fig. on 1 plate, 1 table, 2 appendixes. [11 refs.]

When the canal system of the Punjab was developed, the incidence of parasitic diseases in domestic animals increased considerably. C. suggests that the reason for this is the reduction of mineral matter by the repeated water-logging of the soil, with a resultant dearth of mineral constituents in the fodder grown for the animals. It is probable that mineral deficiencies lower the resistance of sheep, and this was proved to be statistically significant in the case of calves. Moreover, the fodder grown has a large percentage of fibrous constituents which lessen assimilability, and it is suggested that such fodder engenders conditions in the alimentary tract that foster parasitic infestation.

C. describes experiments carried out over a period of three years on 24 sheep and 24 calves (all 48 being males). All were dosed with infective larvae of *Haemonchus contortus* and species of *Oesophagostomum*, and the efficiency of various anthelmintics was tested. Those used were powdered butea, copper sulphate, kamala, melon pumpkin seeds, spineless cactus, oil of turpentine, veronia anthelmintica, and various combinations of these with infusion of embelia, sodium arsenite, ferrous sulphate, aloes and potassium antimony tartrate. [Certain of these are indigenous plants or their products]. Powdered butea with copper sulphate proved fairly effective and the efficiency of a combination of butea with kamala suspended in curd whey was 67%. Copper sulphate with kamala was the most effective combination, the efficacy being 90%, and these drugs are, moreover, reasonably cheap and easily available; a combination of copper sulphate and sodium arsenite was 58% efficient.—A. L. Wilson.

Erhardt, A., & Denecke, K. (1939). Recherches de chimiothérapie sur la strongyloidose des rats. [**Chemotherapy of Rat Strongyloidosis**].—*Ann. Parasit. hum. comp.* **17.** 199-205. 2 tables, 1 graph. [17 refs.]

The authors describe a qualitative method for testing anthelmintic action in strongyloidosis of rats. After heavily infecting the rats, egg counts were carried out daily. A " constant minimum " of egg production was reached 27-30 days after infection and was maintained until the 46th day. The rats were then killed and the adult female worms counted. An average of 175-1,000 eggs per day per worm was obtained. The anthelmintic to be tested was administered on the 33rd day after infection and the rats killed 8-10 days later.

Doses of 5 c.c. per kg. body weight of " bedermine ", a mixture of ascaridol and carbon tetrachloride, were without any anthelmintic action for the strongyloids.

Katharine Sanderson.

Gorovitz, C. (1939). **The Use of Sodium Hyposulphite and Hydrochloric Acid in the Treatment of Mange.**—*Vet. Rec.* **51.** 1097-1098.

A description is given of three cases of demodectic and one of sarcoptic mange in dogs successfully treated by the Russian method with a 40-60% solution of sodium hyposulphite and with a 5-6% solution of hydrochloric acid. Details of technique and frequency of applications are given and the chemical reaction concerned is discussed. The ease of application, low cost and simplicity of the method are emphasized.—H. Burrow.

POISONS AND POISONING

Boko, F. (1938). Oboljenja stoke od ujeda zmija otrovnica. [**Snake Bites in Domestic Animals**].—*Jugoslov. vet. Glasn.* **18.** 110-113. [10 refs.]

An account is given of the pathology of snake bites both in man and animals. In Dalmatia especially, there are two poisonous snakes, *viz*, *Vipera berus* and *V. ammodytes*, the latter being more dangerous than the former. Cases of snake bite are frequently mistaken by the owners either for anthrax or blackleg or for cases of braxy-like disease.

B. studied several cases of snake bite and came to the conclusion that both sheep and dogs are rather sensitive to the venom of *V. ammodytes*. Horses are only moderately susceptible to the venom of this species, and cattle seem to be more or less resistant.

A locally prepared specific anti-venom has been used with good results.

—B. Oswald (Križevci).

Kraybill, H. R. (1938). **Are Feeding Stuffs the Cause of Suspected Poisoning?** —*Rep. Nutrit. Conf. Vet. 1938.* pp. 33-36. Fort Wayne, Indiana: Central Soya Co., Inc.

K. reports having examined, over a period of ten years, over 700 samples of feeding stuffs, suspected of being the cause of death, sickness and decline in production of various types of farm animals and poultry. Harmful ingredients were found in only four, and in general, the food was suspected because of incorrect diagnosis of the cause of the ill-health or death of the animals concerned. K. concludes by stating that the chances are extremely slight that feeding stuffs can be justly blamed for the poisoning of farm animals.—Alfred Eden.

Edgington, B. H. (1938). **Protein Poisoning in Livestock.**—*Rep. Nutrit. Conf. Vet. 1938.* pp. 27-32. 2 photographs. Fort Wayne, Indiana: Central Soya Co., Inc.

The term " protein poisoning " used vaguely by investigators who report upon illness in domesticated animals associated with sudden change of the diet, and who for lack of a more careful diagnosis of the condition are apt to blame the food, is one which E. rightly condemns. There are no specific lesions associated with high protein feeding, and search of the literature fails to reveal any conclusive evidence that protein ingestion, separate and distinct from the consumption of spoiled food, is by itself responsible for any toxicity amongst animals in general.

—Alfred Eden.

Rambe, L. (1938). Chronische Kochsalzvergiftung als ätiologischer Factor bei Inanitionskrankheiten des Rindes. [**Chronic Salt Poisoning as an Aetiological Factor in Inanition in Cattle**].—*Skand. Arch. Physiol.* **78.** Suppl. No. 13. pp. 1-157.

A review article, including experimental work by the author himself, discussing the incidence, aetiology and pathogenesis of osteomalacia and pica in Sweden and the influence of high salt intake as a factor in malnutrition. Observations in the latter connexion include four feeding experiments in which salt intake was raised to abnormal levels. A young bull received supplements of NaCl rising from 30 g. to 250 g. daily over a year, an aged cow was supplied with 100 g. daily for three months and 150 g. for the fourth month, while two lactating cows received 200 g. daily for six months. Loss of weight occurred in all cases and the bull became impotent. Studies of " curry comb samples ", *i.e.* of scurf, showed greatly

increased excretion of sodium chloride through the skin, with irritation and subcutaneous oedema. In the case of the bull several phases of haemoglobinuria occurred, preceded by oliguria and rise of weight, due to marked water retention, followed by polyuria and loss of weight. Evidence from balance experiments on the cows indicated loss of calcium, and bone analysis indicated some demineralization in three out of the four cases. The raised salt content of the rumen reacted adversely on the protozoan flora.—H. H. Green.

Wautié, M. (1939). Contribution à l'étude de l'intoxication par les sels de sodium et les saumures. **[Salt and Brine Poisoning].**—*Ann. Méd. vét.* **84.** 349-369. [12 refs.]

After observing accidental cases of brine poisoning in pigs, W. fed 675 g. of pure NaCl to two pigs, each weighing 35 kg., over a period of 34 days. Mild diarrhoea was the only symptom noted, and he concluded that it was difficult to poison pigs with salt since they refuse food containing it in sufficient quantity. In further experiments 100 g. of salt were ingested in 24 hours when the pigs had been previously starved, and in others 100-150 g. were given in 1-1½ litres of water by stomach tube. No serious disturbance followed, but 150 g. by stomach tube caused vomiting. A low blood calcium was noted in one case, but was normal in two days. In all cases the pigs weighed 30 kg.

In three fatal cases of brine poisoning two died in convulsions within two hours, but of two experimental pigs each receiving 950 c.c. over a period of eight days, one died of acute enteritis and ascites, and the other recovered. W. confirms the confusion that exists as to the toxic dose and symptoms of salt and brine poisoning. As to salt poisoning, he thinks the Na cation responsible rather than the Cl anion or the whole molecule, but does not explain its action. He does not recommend the use of saline purgatives with a Na base in animals with a nervous or humoral tendency. Low blood calcium (he found 0·146 mg.% to be normal for young pigs) is frequently found, but tetanic symptoms may appear when the calcium level is normal. He considers the injection of calcium to be the best line of treatment.—R. Bamford.

Moxon, A. L., Olson, O. E., & Searight, W. V. (1939). **Selenium in Rocks, Soils and Plants.**—*Tech. Bull. S. Dak. agric. Exp. Sta.* No. 2. pp. 94. 27 figs., 74 tables. [Numerous refs.]

This communication deals principally with the geological and geochemical distribution of Se in the rocks of South Dakota. There is a discussion on the "converter" plants, and on the available data a hypothetical Se cycle is given. Control measures for Se poisoning are briefly discussed, but the main points of veterinary interest have already been covered in the *V. B.*—Alfred Eden.

Anon. (1939). **Fluorine Poisoning.**—*Brit. med. J.* May 27th. 1097-1098. [1 ref.]

Man is peculiarly sensitive to the action of F, 0·1 mg. per kg. body weight leading to mottled teeth in children, although the rat is only one-tenth as sensitive. The risk of F poisoning is at present being increased (1) by the use of underground waters, chronic endemic fluorosis being induced when the F exceeds 1 p.p.m., (2) by the increased use as a fertiliser of superphosphates containing F, and (3) by the exclusive use of fluorides as insecticides; although NaF has a lower acute toxicity than the arsenite when used as an insectide the danger of chronic poisoning is much greater. Workers in factories where there is fluoride dust suffer from a peculiar form of osteosclerosis. A report from South Africa indicates that there are areas, not deficient in I, where the natives suffer from goitre associated with

bad teeth, and F is suggested as the causative agent. The problem of F poisoning has attracted increasing attention all over the world during the last five years. —Alfred Eden.

Grimmett, R. E. R., & McIntosh, I. G. (1939). **Occurrence of Arsenic in Soils and Waters in the Waiotapu Valley, and its Relation to Stock Health. Part I.**—*N.Z. J. Sci. Tech.* **21.** 137A-145A. 4 figs., 2 appendixes. [5 refs.] [Authors' summary copied *verbatim*].

Fitch, L. W. N., Grimmett, R. E. R., & Wall, E. M. (1939). **Occurrence of Arsenic in Soils and Waters in the Waiotapu Valley, and its Relation to Stock Health. Part II.—Feeding Experiments at Wallaceville.**—*Ibid.* 146A-149A. 2 tables. [1 ref.] [Authors' summary copied *verbatim*].

Grimmett, R. E. R., McIntosh, I. G., Wall, E. M., & Jones, G. B. (1939). **Occurrence of Arsenic in Soils and Waters in the Waiotapu Valley, and its Relation to Stock Health. III.—Experiments, Observations, and Analytical Results on Farm Animals at Reporoa.**—*Ibid.* 150A-160A. 1 fig., 6 tables. [11 refs.] [Authors' summary copied *verbatim*].

I. Sickness and death of cattle, especially dairy cows, on drained swamp land at Reporoa, in the thermal region of the North Island, is associated with high arsenic content in soils and waters.

Other causes of stock morbidity such as " bush sickness " (cobalt deficiency) and poisoning by " Waoriki " (Ranunculus rivularis), though possible or existent in various parts of the central volcanic region, are considered inadequate to account for all the special features exhibited at Reporoa.

The nature and origin of the arsenic compounds present in the soils and waters is discussed and a detailed survey of their occurrence presented.

Muds varied in arsenic content from 0·0068 to 1·9 per cent. of As, soils from 0·0008 to 0·525 per cent. of As, and waters from a trace to 2·6 grains As_2O_3 per gallon. [2 appendixes give numerous analyses of soils and waters.—Ed.]

II. The results of drenching experiments with a cow using moderately large doses of sodium arsenite, and subsequent post mortem examination and analyses, were in general agreement with Ramsay and Seddon's findings as to minimum toxic dose and recoveries of arsenic from the various organs.

Drenching experiments with two types of moderately arsenical Reporoa mud over long periods, using amounts containing sub-toxic doses of arsenic, showed that where the arsenic was combined with iron it was fairly completely assimilated and excreted, so that the animal was in balance as regards arsenic and no accumulation to toxic levels occurred, the animal remaining healthy, but that where the arsenic was present as the sulphide it was not assimilated.

It is concluded that the impure limonite or ferruginous mud containing arsenic is one of the principal sources of arsenic assimilation by live-stock in the Reporoa district. [Tables giving amounts of arsenic ingested and secreted in milk and urine are appended.—Ed.]

III. A detailed survey of live-stock morbidity in the Reporoa district was carried out over a period of approximately six months. Analyses of urine and milks from living animals were made. All cases of death were investigated, and, where necessary, post mortem examinations were made and samples of the organs analysed.

Post mortem notes and arsenic contents of organs are given in respect to nine cases of death thought to have been due to arsenic. Arsenic contents of urine are given for various months, and a possible correlation with weather conditions and health of the stock is discussed.

Of six animals (two cows, two heifers, two steers) kept under experimental control on an arsenical area for eleven months, two remained healthy throughout, two became sick but recovered, and two died, being considered from the analysis of the organs probable cases of arsenic poisoning.

Arsenic content of clean pasture samples from the arsenical areas ranged from 0·6 to 23 mg. As_2O_3 per kilogram of dry material, averaging 7·3 mg. per kilogram. This is not considered a likely source of poisoning.

Prolonged cobalt drenching of several sick cows resulted in no improvement. The animals later recovered spontaneously when feed became more plentiful. The arsenic content of urine, which had been high, fell concurrently with their recovery.

It is concluded that some cases both of acute and chronic arsenic poisoning in cattle occur at Reporoa, the chief sources of arsenic assimilation being soluble arsenic in water-supplies and from arsenical ferruginous deposits in the soil and along the margins of drains.

FINNEMORE, H., & COOPER, J. M. (1938). **The Cyanogenetic Constituents of Australian and Other Plants.**—*J. Soc. chem. Ind., Lond.* **57.** 162-169. [Numerous refs.] [Authors' summary copied *verbatim*].

The cyanogenetic constituents of *Lotus australis* is a mixture of two glucosides, the chief of which is new and is shown to be the glucoside of the cyanohydrin of methyl ethyl ketone. It appears to be contaminated with small quantities of linamarin, the cyanogenetic glucoside of the lower homologue, acetone. Pinitol (*d*-methylinositol) has also been isolated.

Wild white or Dutch clover also contains lotaustralin, and *d*-methylinositol which has been previously isolated from other plants.

The chief cyanogenetic constituent of *Ximenia americana* is sambunigrin, a mandelonitrile glucoside already isolated from other plants, *d*-Methylinositol is also present.

I. BAGCHI, K. N., & GANGULI, H. D. (1939). **Some Observations on the Toxicology of Linseed Plant** (*Linum usitatissunum Linn*).—*Indian J. vet. Sci.* **9.** 61-66. 2 tables. [4 refs.]

II. ISNARD, J. (1939). Quel est le moins mauvais mode de distribution des tourteaux de lin cyanogénétiques. [**The Safest Way of Using Cyanogenetic Linseed Cake**].—*Rev. Méd. vét., Toulouse.* **91.** 212-219. [Numerous refs.]

III. ISNARD, J. (1939). Contribution à l'étude des tourteaux de lin cyanogénétiques. Leur toxicité vis-à-vis du mouton. [**Cyanogenetic Linseed Cake and Its Toxicity for Sheep**].—*Rec. Méd. vét.* **115.** 278-282.

I. Cattle poisoning by linseed flowers is stated to be fairly common in Bengal and Bihar. The symptoms are described for fatal and non-fatal cases. The authors determined the HCN yield from different parts of the linseed plant and found that the flowers with immature seeds contain the greatest amount of the cyanogenetic glucoside, producing as much as 0·69% of free HCN. About half-a-pound of these flowers would be sufficient to kill a bullock. In order to ascertain the effect of time and concentration of acids and alkalis (water, hydrochloric acid, lactic acid, caustic soda, sodium carbonate and bicarbonate, and water containing 1% glucose and 1% maltose) on hydrolysis of the glucoside, linseed cake was prepared from the same crop, soaked in the different media, incubated at 37°C., and then submitted to analysis. It was determined that liberation of the maximum amount of HCN takes place in a neutral medium in about four hours. Normal acid or alkali stops the action altogether, and, as an antidote, a strong solution of

sodium carbonate is suggested, but it must be administered early. The authors failed to detect any inhibitory action by glucose or maltose *in vitro*. It is suggested that, since during absence of food for some time the reaction of the stomachs becomes neutral, the possibility of poisoning is increased when an animal grazes in a linseed field on an empty stomach.

II. The author contends that only after the complete destruction of linamarine can linseed cake be regarded as innocuous for cattle. The ideal way of effecting this would be at the oil refineries. He regards scalding of the pulverized cake and then leaving it for 24 hours before feeding as the most practicable method of preparation. By allowing this interval to elapse, one may be certain that all the glucoside has been hydrolysed and all the HCN released. At the time of scalding there is intense liberation of HCN, which, if the cake is fed immediately, may give rise to poisoning. It is suggested that certain of the intestinal ferments are capable of acting on the glucoside and releasing HCN.

III. The author records two outbreaks of fatal poisoning in lambs, which he attributed to the feeding of cyanogenetic linseed cake. In the first of the outbreaks the cake was fed to 1-month-old lambs, which died some hours after feeding; on analysis, the cake yielded 0·07% HCN. In the second instance, four lambs died three days from the commencement of feeding 125 g. of dry linseed cake daily; this cake yielded 0·0324% HCN. Similar cases are cited from French literature.

—N. J. Scorgie.

Steyn, D. (1939). **The Sensitivity of the Picrate Paper Test (Guignard Test) for Hydrocyanic Acid.**—*J. S. Afr. vet. med. Ass.* **10.** 65-68. 1 table. [6 refs.]

The limit of the sensitivity of the picrate paper test was found to be about ·00125 mg. potassium cyanide and ·00052 mg. hydrocyanic acid. Where reducing substances were present, it was found that the most reliable and sensitive test was the ferric sulphocyanate. The limit of this test for hydrocyanic acid is 1:4,000,000.

—E. M. Robinson.

Velu, H., & Boutrois, M. (1939). Intoxication par la mélasse et analyse du contenu stomacal. [**Poisoning by Molasses and the Analysis of Stomach Contents**].—*Bull. Acad. vét. Fr.* **12.** 289-291. 1 table.

In an investigation of suspected molasses poisoning, the authors had occasion to examine the rumenal contents of sheep receiving heavy daily quantities of molasses, and were surprised to find no trace of sugar. In a further experiment, sheep were killed off at definite intervals after receiving a known amount of sucrose (as molasses). Two hours afterwards, about four-fifths of the ingested sugar had disappeared despite the absence of rumination. The fate of the sugar which disappeared was unknown, but the evidence presented was sufficient to show that because of this rapid disappearance analysis of the contents of the rumen could give no indication of the amount of sugar ingested.—Alfred Eden.

PHYSIOLOGY

Peters, R. A. (1939). **Tissue Respiration.**—*Nature, Lond.* **144.** 1070-1073. 2 figs. [Summary of a Discussion of the British Association at Dundee, 1939].

Various aspects of the field of tissue respiration were discussed by different contributors. After the historical background had been covered, the mechanism of tissue respiration, essentially one of catalysis, was described with numerous

examples. Next, a summary was given of the recent development in knowledge of the flavo-proteins, of which six new ones have been described. Other contributors dealt with tissue slice technique, mechanisms explaining the production of CO_2, and the processes of H and phosphate transfer involved in fermentation and respiration. The effects of narcotics upon organized tissue respiration systems were considered, and further contributions included a study of how the cell controlled its rate of respiration, the part played by pyruvic acid in carbohydrate breakdown and the systems involved in further splitting up of pyruvate. The practical question of local tissue anoxia in arterial disease and its treatment by oxygen was also considered. Though only the more important points discussed could be covered, this article makes clear what extensive advances have been made in this particular field within the last few years.—Alfred Eden.

LeMasurier, H. E., & Branion, H. D. (1939). **Some Observations on the Skeletal Development of the Fowl to Six Weeks of Age.**—*Poult. Sci.* **18.** 114-122. 2 text figs., 2 plates, 1 table. [17 refs.]

These observations on male and female birds of the New Hampshire, Barred Plymouth Rock, and White Leghorn breeds, were undertaken to establish a standard for normal skeletal growth. X-ray was employed, the advantage being that it showed the degree and extent of calcification, and shape and growth of the skeleton, without necessitating slaughter.

Battery-raised chicks showed a more extensive calcification, with increase of weight, than those raised in the brooder. This is attributed to the fact that the former were able to feed the whole day. The increase was most marked in the extremities of long bones and was not co-ordinated with general skeletal development or tissue growth. Further, the authors point out that growth in length ceases when calcification of growing cartilaginous extremities of long bones is complete.—C. W. Ottaway.

Wise, G. H., & Anderson, G. W. (1939). **Factors Affecting the Passage of Liquids into the Rumen of the Dairy Calf. I. Method of Administering Liquids : Drinking from Open Pail versus Sucking through a Rubber Nipple.**—*J. Dairy Sci.* **22.** 697-705. 1 fig., 4 tables. [15 refs.]

Two methods were employed, namely, the administration of stained milk, the animal being killed immediately, and direct observation through permanent rumen fistulae which were established in 7 calves. A large number of observations were made on the fistula animals, and the amount of fluid which passed into the reticulum and rumen during drinking and sucking was roughly determined.

When milk was sucked from a rubber teat it entered the reticulum and rumen in 2·2% of cases and then only in amounts not exceeding 3 ml. When milk was drunk from a pail it entered the reticulo-rumen sac in 36·9% of cases ; in nearly half of these cases the amount was less than 25 ml. The experiments were repeated with water ; it was found that water entered the reticulo-rumen sac in comparatively large quantities in 96·1% of cases when it was drunk from a pail, but when it was sucked it entered this sac in 29·9% of cases and then only in small quantities. [The ages of the animals during the period of observation are not given].—A. T. P.

Leasure, E. E., Link, R. P., & Whitlock, J. H. (1939). **The pH (Hydrogen Ion Concentration) of the Contents of the Digestive Canal of the Equine.**—*Cornell Vet.* **29.** 362-366. 3 tables. [5 refs.]

The material was obtained from horses over 10 years old and was examined 8-20 mins. after the death of the animal. The pH determinations were done

electrometrically, using the quinhydrone electrode. The average results obtained were as follows :– stomach 4·45 (104 determinations, range 2·01-8·6) ; duodenum 7·13 (71 determinations, range 6·48-8·48) ; jejunum 7·46 (70 determinations, range 6·87-7·88) ; ileum 7·54 (71 determinations, range 5·88-8·03) ; caecum 7·23 (170 determinations, range 6·02-7·91) ; large colon 6·09 (135 determinations, range 6·39-8·61) ; rectum 6·24 (21 determinations, range 5·39-7·13).

Some of the stomachs examined were empty and it was among these that the two extremes were included. In about 20% of the material obtained from the duodenal and iliac regions, the contents were mucilaginous ; this was associated with a high pH.—A. T. Phillipson.

Warren, R. (1939). **Serosal and Mucosal Dimensions at Different Levels of the Dog's Small Intestine.**—*Anat. Rec.* **75.** 427-437. 3 figs., 4 tables. [11 refs.] [Author's summary copied *verbatim*].

1. The mucosal and serosal linear dimensions, both longitudinal and circumferential, at five levels of the autopsied small intestine of a dog have been measured and the error of these measurements has been indicated.

2. A formula is suggested which from these dimensions permits a crude estimate of mucosal area.

3. The estimate of the ratio of mucosal area to serosal area for the whole small intestine was 8·5/1.

4. The estimate of the total mucosal surface was 1·6 square meters of which 7% was in the duodenum.

5. Striking decrease in mucosal area per unit of serosal area or of serosal length is observed as one descends the gut to the mid ileum.

6. The impropriety of applying these results directly to the human subject is emphasized.

Ejury, F. (1937). A szarvasmarha vizeletének kéntartalmáról. **[The Sulphur-Content of the Urine of Cattle].**—*Thesis, Budapest.* pp. 15. 2 tables. [Numerous refs.] [German summary].

The sulphur content of the urine of ten unweaned and ten weaned calves, ten milch cows, 28 other cows, 20 oxen and four buffaloes was estimated, and it was found that adult animals excreted about ten times as much sulphur as calves. The S content in the urine of calves was less than their S intake (1·25 g. S per day with an intake of 3·26 g. for suckling calves and 3·0 g. S per day with an intake of 6·5 g. for weaned calves). E. assumes that S is retained by growing animals for the production of tissue. A similar S retention was also found in pregnant cows, the S content of the urine decreasing with advancing pregnancy and rising suddenly after calving.

The urine of working oxen and buffaloes was found to have a high S content (an average of 3·65 g. in 1,790 c.c. urine excreted during work [0·204 g. per 100 c.c.]).
—E. Martin.

Selye, H., & Folgia, V. G. (1939). **On the Formation of Haemolymph Nodes During the Alarm Reaction.**—*Amer. J. Anat.* **64.** 133-142. 4 figs. on 1 plate. [Numerous refs.]

These experiments demonstrate that, following the induction of an " alarm reaction " in rats, erythrocytes appear in the sinuses of the various lymph nodes. This invasion is only transitory and they are removed by phagocytes within three days. The intravenous injection of fluid increases this haemolymph node formation, but does not in itself produce it. Apart from their bright colour, these nodes

differ from the normal dark brown haemolymph nodes in that the latter contain blood pigment-storing phagocytes only. It is suggested that the formation of these nodes may be associated with the initial defence of the body to bacterial invasion.

In all, 38 female rats were used. The " alarm reaction " was produced by exposure to cold for three hours, the injection of 0·5 c.c. of 4% formaldehyde solution, or muscular activity for two hours.—C. W. Ottaway.

Bogue, J. Y. (1939). **Some Recent Advances in the Physiology of Cardiac Function.**—*Vet. Rec.* **51.** 991-998. 5 figs.

From observations on chick-embryo heart, it was concluded that the shape of an electrocardiogram cannot be dependent upon the presence of fibrillae or syncytial formation. Further work showed that when a heart is stimulated, the height of the electrical response is not proportional to the strength of the mechanical response. A study of the carbohydrate metabolism of cardiac muscle indicated that the true usage of glucose is in the neighbourhood of 100 mg. per hour per 100 g. heart muscle, and that at the same time the heart uses a considerable amount of lactic acid. In fact, evidence was obtained that the heart uses lactate in preference to glucose and that a failing heart should be treated with lactate and not glucose. On the other hand the heart's store of glycogen is replaced from glucose and not lactate. An increase in the pulmonary resistance to the outflow of the right heart reduces considerably the output of the left heart. This is probably due to back-pressure effects on the coronary circulation.—J. A. Nicholson.

Loosli, C. G. (1937). **Interalveolar Communications in Normal and in Pathologic Mammalian Lungs. Review of the Literature.**—*Arch. Path.* **24.** 743-776. 21 figs. [Numerous refs.]

Normal lungs, some prepared by intratracheal injection of heparinized blood plasma, and lungs from animals with experimentally induced, non-lethal, pneumococcus type I infections, were cut in thick and thin sections for microscopic examination.

The presence of interalveolar pores was clearly established in all specimens. They are normal structures that develop in early post-natal life through thinning and perforation of the mesenchymal ground substance in the intercapillary spaces of the alveolar walls. They are canals of variable size (rarely greater than 13μ in diameter) and shape, lined by the ground membrane that surrounds the alveolar capillaries. Their walls are supported by reticular fibres.

Attention is drawn to the importance of such pores as a means of intralobar spread of oedema fluid, inflammatory exudate and malignant tumour cells.

No evidence of the existence in the alveoli of a continuous epithelial lining was found. Scattered over the alveolar surfaces were single nucleated cells of endodermal or mesodermal origin ; by hypertrophy and desquamation of these cells, free alveolar macrophages arise.

L. described his technique and histological findings and gave a thorough review of the literature.—J. W. Whittick.

Klein, W., & Broicher, C. (1938). Studien über das Blutbild warmblütiger Tiere, gerichtet auf die Konstitution. [**Blood Picture of Warm-Blooded Animals in Relation to Body Constitution**].—*Z. Zücht. B.* **140.** 149-192. 2 plates, 5 charts. [Numerous refs.]

The authors state that in discussing the relation between the elements of the haemopoietic system and the constitution of animals, it is necessary to consider not

only the general anatomical and physiological features, but also such problems as individual qualities. For example, although it can be explained that on account of the alkalinity of the ruminant, monocytes and plasma cells exist in the normal animal in a form which would denote a pathological condition if they were present in that form in man, it is not easy to understand why they exist in different forms in two animals of the same type and species. It is suggested, however, that the reticulo-endothelial system plays the most important cellular role in this determination of individual characters. The work of the authors is concerned chiefly with the ruminant and man. In the ruminant the dominant factor is the white cell. Shortly after birth these cells are present in large numbers, although precursors are still present. Their relation to the different functions of life, such as work, rest, lactation, pregnancy, birth, and old age are discussed in detail and the percentages illustrated by means of charts. The lymphocytic blood picture is developed in accordance with the alkaline requirements of the body and varies with this factor.

The authors discuss the normal blood picture at the different ages.—C. W. O.

Kassem, H. (1938). Züchtungsbiologisch-konstitutionelle Studien an schwarzbunten Niederungsrindern mittels Bestimmung der Widerstandskraft der roten Blutzellen gegenüber hypotonischen Salzlösungen. [**Power of Resistance of Red Blood Cells of Pied Lowland Cattle to Hypotonic Salt Solutions**].—*Inaug. Diss., Berlin.* pp. 101. Numerous tables. [Num. refs.]

In order to determine if there is any connection between the fragility of R.B.C's. in hypotonic saline solutions and the breeding or milk producing powers of an animal, K. studied the haemolysis of blood from a large number of cattle using Demmel's method. The only factor which could definitely be shown to influence the fragility of the corpuscles was that of age ; their resistance to hypotonic saline increased from birth onwards. Indications were obtained that the resistance of the corpuscles is greater in females than in males. Pregnancy, milk yield, feeding, etc., did not affect the fragility of the corpuscles.—J. A. Nicholson.

Drummond, J. C. (1939). **The Fat-Soluble Vitamins.**—*Ann. Rev. Biochem.* **7.** 335-352. [Numerous refs.]

D. provides a readable summary of the extensive advances made during the period covered by his review. Since many of the original articles of veterinary interest have been abstracted for the *V. B.*, it is convenient to summarize the main points as follows :–

Vitamin A.—This vitamin has been synthesized and isolated in crystalline form from a natural source, *i.e.* the unsaponifiable fraction of a fish liver oil. There is new evidence that more than one form of the vitamin exists, and there is also confirmation of the fact that fats in the diet facilitate the absorption of both carotene and vitamin A. It has been shown that in 4 species, *viz.* cattle, sheep, pigs and rats, the minimum carotene and vitamin A requirements necessary to prevent night-blindness, the first recognizable sign of vitamin A deficiency, are approximately the same per unit body weight. The evidence that chronic vitamin A deficiency plays a role in the aetiology of renal and cystic calculus formation is becoming more significant.

Vitamin D group.—The superior antirachitic potency of summer butter has been shown to be due to the exposure of the cows to sunshine and skyshine, and not to be due to pasture feeding. Ergosterol has been isolated from the cholesterol of egg-yolk, and 7-dehydrocholesterol has been isolated from pig skin. One investigator believes that six, and possibly eight, different forms of vitamin D exist.

Further experiments with chicks have demonstrated the reduced need for vitamin D in cases in which the Ca and P of the diet is adequately balanced.

Vitamin E.—The advances discussed are fully dealt with in the more recently published symposium on vitamin-E (see *V. B.* **10.** 405).

Vitamin K.—Distillation in high vacuum has facilitated the production of a crystalline fraction, the addition of only 2-4 mg. per kg. of which to a basal diet prevents characteristic haemorrhages in young chicks. [Since the publication of this review, there have been notable advances in the chemistry of this vitamin and in the study of its requirements by other species.]

Gizzard-erosion factor.—Whereas KLINE and his colleagues consider that a water-soluble nutrient is the controlling factor in the maintenance of a healthy gizzard lining in young chicks, ALMQUIST, on equally convincing evidence, ascribes the power to a fat-soluble substance. D. suggests that, apart from the possibility that more than one factor may be required, there may be an analogy with the oral mucosa of dogs, in which tissue, as has been recently explained [see *V. B.* **8.** 724], a deficiency of either vitamin A or nicotinic acid may lead to ulcerative lesions, caused by the same group of secondary invaders.

A great advance in the technique of the isolation of fat-soluble vitamins has been the development, in the U.S.A., of a new form of molecular still. The new process is so successful that a pilot plant is already producing enough pure vitamin A to supply one-tenth of the demand in the U.S.A.—ALASTAIR N. WORDEN.

WINTERSTEINER, O., & SMITH, P. E. (1938). **The Hormones.**—*Ann. Rev. Biochem.* **7.** 253-304. 2 tables. [Numerous refs.]

The review deals essentially with the year's work on the suprarenal cortex and on the sex hormones. The suprarenal cortex contains several substances, belonging to the steroid group, which exert a " cortin " like action, the chief of which is the maintenance of life in the adrenalectomized animal. In patients exhibiting manifestations of the adreno-genital syndrome a new steroid has been found in the urine, which also has a high androgen content. There is further work to show the intimate connexion between the suprarenal cortex and the electrolyte and water balance in the body. VERZÁR and his co-workers believe that the disturbances of the electrolyte metabolism which follow adrenalectomy are secondary to the impairment of carbohydrate utilization, which in turn is referred to the general failure of phosphorylation processes in the cells. Experiments are reviewed which suggest that the suprarenal cortex secretes an androgenic principle (or principles). This has been confirmed by more recent work. SELYE believes that the adrenals are concerned in the adaptation of the body to certain nocive stimuli (" alarm reaction "), such as exposure to low temperature, excessive muscular work, drugs, etc. The action of testosterone and of other androgens can be prolonged and modified by esterification and by the simultaneous administration of certain activators. HILL has advanced evidence that the ovaries can secrete an androgen. There is further work which shows that androgens can maintain the seminiferous tubules and spermatogenesis in the hypophysectomized animal. There is much work to show that certain androgens produce various actions in the female ; they inhibit the oestrous cycle and menstruation, inhibit lactation and have certain effects, similar to those of progesterone, on the uterine endometrium and muscle. The activity of various esters of oestrogens and of certain synthetic non-steroid oestrogens is discussed. MARRIAN and his co-workers have found that the intestine contains an enzyme, glucuronidase, which is responsible for the high oral activity of oestriol glucuronide. In mare's urine, the oestrogens are conjugated with sulphuric acid. The recent work on the colorimetric estimation of oestrogens is

reviewed. There is evidence that oestrogens stimulate the pituitary secretion in immature animals. New derivatives of progesterone have been described by MARKER and his co-workers, and it has been shown that pregnandiol is excreted only during the luteal phase of the ovarian cycle. The function of the corpus luteum may be maintained in the hypophysectomized animal by the administration of oestrogens, and ROBSON has suggested that this is the mechanism directly responsible for the maintenance of the luteal function during pregnancy. Further work on the interrelation between oestrogen and progesterone in the control of the endometrium in the menstrual cycle is described. Work on the changes in the electrical potential in women and their application to the determination of the time of ovulation is discussed. Further work on the separation of various pituitary gonadotrophic fractions is described. Evidence for and against the view that there exists more than one gonadotrophic factor is discussed. There is further work on the part played by prolactin and by other factors in the control of lactation. The year's work has not revealed the nature of the anti-substance which develops during prolonged treatment with certain hormones (anti-hormones).—J. M. R.

DODDS, E. C. (1939). **The New Endocrinology, I—The Pituitary. II—Chemistry of the Sterols. III—The Male Sex Hormones, IV—The Female Sex Hormones.**—*Lancet.* **237.** 800-802, 844-845, 894-896 and 953-954. 25 figs.

I. The first of a series of articles forming a review of present views on the function of the pituitary, the chemistry of the steroids, and the functions of androgens and oestrogens (so called male and female hormones). In this paper the functions of the various pituitary hormones are briefly dealt with. The illustrative diagram shows emmenin as a follicle-stimulating hormone produced by the placenta ! The part played by vasopressin in the control of capillary blood flow is briefly discussed.

II. Deals with the nomenclature of the steroids.

III. The work which led to the discovery of testosterone (the hormone produced by the testes) and of its metabolic product present in the urine, androsterone, is described. Androgens are present both in the male and in the female, and are excreted in the urine of both sexes. The excretion of androgens is greatly increased in certain pathological conditions, especially in cases of adrenal tumours, and there is evidence that the adrenals may produce androgens under physiological conditions.

IV. The work which led to the discovery of oestradiol and other oestrogenic substances is reviewed and the main actions of these substances are briefly described. The investigations which led to the discovery of comparatively simple substances, non-steroid in structure, which possess very high oestrogenic activity, are then dealt with. These substances, *e.g.* diethyl stilboestrol, are active when given orally and appear capable of replacing all the known functions of the naturally occurring oestrogenic substances.—J. M. ROBSON.

ROWLANDS, I. W., & YOUNG, F. G. (1939). **The Capacity of Pituitary Preparations Containing the Thyrotrophic Hormone to Induce the Formation of Antisera.**—*J. Physiol.* **95.** 410-419. 1 fig., 2 tables. [19 refs.]

In order to study the properties of antithyrotrophic sera, purified pyridine extracts of anterior lobe were prepared and injected into female rabbits, and the serum of the rabbits so treated was tested on g. pigs. No relationship could be established between the thyrotrophic activity of the extract used for immunization and the antithyrotrophic activity of the resulting serum. It is assumed, therefore, that the antigenic substance and the hormone are not identical, although it seems that the inhibitory substances to hormones are antibodies in the immunological

sense. It was also found that relatively pure preparations of prolactin, containing no detectable trace of thyrotrophic hormone, induced the formation of anti-thyrotrophic serum when injected into rabbits.—J. A. NICHOLSON.

ROBSON, J. M. (1939). **Maintenance of Pregnancy in the Hypophysectomized Rabbit by the Administration of Oestrin.**—*J. Physiol.* **95.** 83-91. 2 figs. on 1 plate, 2 tables. [11 refs.]

Hypophysectomy in the rabbit during the later stages of pregnancy is followed by abortion within 24-48 hours but, provided adequate doses were given, it was found possible to prevent abortion by the administration of oestrogenic compounds, particularly oestradiol benzoate. When too large doses were used death and reabsorption of the embryos took place. It is suggested that the results can only be explained by assuming that oestradiol and not gonadotrophic hormone is necessary to maintain the luteal function of the ovary during pregnancy. A decrease of oestrogen production during pregnancy would, therefore, lead to a cessation of the luteal secretion and to abortion.—J. A. NICHOLSON.

I. GEY, G. O., SEEGAR, G. E., & HELLMAN, L. M. (1938). **The Production of a Gonadotrophic Substance (Prolan) by Placental Cells in Tissue Culture.**—*Science.* **88.** 306-307. [2 refs.]

II. ASTWOOD, E. B., & GREEP, R. O. (1938). **A Corpus Luteum-Stimulating Substance in the Rat Placenta.**—*Proc. Soc. exp. Biol., N.Y.* **38.** 713-716. [8 refs.]

III. WESTMAN, A., & JACOBSOHN, D. (1937). Ueber Oestrinwirkungen auf die Corpus luteum-Funktion. II. Mitteilung. [**Effect of Oestrin on Corpus Luteum Function**].—*Acta obstet. gynec. scand.* **17.** 13-23. 1 table. [In German: English and French summaries].

IV. ASTWOOD, E. B., & GREEP, R. O. (1939). **Nomenclature of Gonad-Stimulating Hormones of Placental Origin.**—*Science.* **89.** 81.

V. ANON. (1939). **The Placenta as a Ductless Gland.**—*Lancet.* **236.** 585-586. [7 refs.]

I. The authors claim to have produced evidence in support of the generally accepted theory that the placenta produces the anterior-pituitary-like hormone (prolan) excreted in human urine during pregnancy. It was found that the fluid from tissue cultures of a three months' placenta and a hydatiform mole exhibited hormonal activity when tested by the Aschheim-Zondek and Friedman tests. The results of the experiments permit the following conclusions:– (1) placental cells produced a substance similar to the prolan-like substance found in human pregnancy urine; (2) these cells, growing in tissue culture, retained the ability to produce the hormone for over two months; (3) the cells responsible for this hormonal activity were possibly the Langhan's cells, and (4) a hydatiform mole growing in tissue culture for one month also produced the hormone.

II. The function of the corpora lutea of the rat during the first half of pregnancy is under control of the hypophysis, but it is apparent that some extra-pituitary control is responsible for luteal function in late pregnancy. The results reported in this paper indicate that in normal pregnancy in the rat the foetal placenta (chorion) secretes a substance which is responsible for the maintenance and function of the corpora lutea during the latter half of pregnancy. [Similar results have been reported in the mare]. The authors show that this substance is dissimilar to any known gonadotropic substance of pituitary origin and that it can be differentiated from the pregnancy hormones of the human being and the mare.

III. The authors have previously shown that administration of oestrone prolongs the persistence of an active corpus luteum. In order to determine whether the oestrone acts directly on the ovary or through the hypophysis, a series of experiments was carried out in which hypophysectomized pseudogravid animals were treated with oestrone. It was found that the corpus luteum, which usually degenerates on the 3rd or 4th day following hypophysectomy remains functional, as a result of oestrone treatment, as long as 13 days following the hypophysectomy.

IV. The terms used for the gonadotropic substances which arise from or are associated with the products of pregnancy are in most cases ambiguous and cumbersome. The authors propose that the term " cyonin " be applied to all hormones of chorionic origin which act in prolonging corpus luteum function. Thus such terms as " pregnant mare serum ", " human pregnancy urine ", etc. would be replaced by " equine cyonin ", " human cyonin ", etc.

V. A short review dealing with the above publications. The conclusion is made that it is now fairly certain that the placenta secretes some non-oestrogenic substance which is different from anything produced by the anterior pituitary; but since animals differ so widely in the details of their endocrine management of pregnancy, it must not be assumed that the production of such a hormone is a universal function of the placenta. Caution should, therefore, be adopted in defining such a hormone by a specific name such as " cyonin ".—N. J. Scorgie.

Cole, H. H., & Goss, H. (1939). **Gonadotropic Hormone in the Non-Pregnant Mare.**—*Amer. J. Physiol.* **127.** 702-709. 3 tables. [10 refs.] [Authors' summary copied *verbatim*].

1. Gonadotropic hormone is present in the blood serum of non-pregnant mares at all phases of the estrous cycle. There is some indication that the greatest concentration is reached during metoestrum.

2. The hormone could not be distinguished biologically from that found in the pregnant mare.

3. The highest concentrations of hormone were found in mares with prolonged cycles or in mares which failed to come into estrus during the observation period.

4. No evidence was found that mare serum contained two gonadotropic hormones, FSH and LH.

Zsemlye, G. (1937). Tartalmaz-e a vemhes tehenek vizelete progesteront? [**Progesterone in the Urine of Pregnant Cows**].—*Thesis, Budapest.* pp. 20. 5 figs., 1 table. [16 refs.] [German summary].

In experiments with Hetzel's modification of the Clauberg pregnancy test, ovariectomized immature rabbits, treated with a concentrated oestrone preparation, were given daily, over a period of five days, 0·3-0·4 c.c. of lipoid extract prepared from cows' urine. It was shown that the urine of cows at the fifth month of pregnancy contained an appreciable quantity of progesterone (luteal hormone). In the first half of pregnancy, on the other hand, progesterone could be demonstrated by this means in only one out of four cows; in this animal the hormone was present from the first month.—G. Sályi (Budapest).

Folley, S. J., & Watson, Helen M. S. (1939). **Induction of Abortion in the Cow by Inunction with Stilboestrol Dipropionate.**—*Lancet.* **237.** 788-789. 1 table. [3 refs.]

Over a period of 34 days, a total amount of 1·25 g. of stilboestrol dipropionate incorporated in ointment was administered to each of four pregnant and lactating cows by inunction of the udder. Four pregnant and lactating cows kept as controls

were similarly treated with the same ointment minus the oestrogen. Two of the experimental cows, in more advanced pregnancy, aborted on the day following the last inunction. The third cow gave a doubtful result, while the fourth failed to abort.—J. R. Lawson.

McNutt, S. H., Schwarte, L. H., & Eveleth, D. F. (1939). **The Hydrogen Ion Concentration of Vaginal Secretions of Cows.**—*Cornell Vet.* **29.** 415-419. 2 figs. [4 refs.]

The reaction of the vaginal secretions of eight virgin heifers and three cows was determined daily over periods of 18-37 days. 50 c.c. of warm normal saline were introduced into the vagina and withdrawn after one minute; the pH of the saline was then determined by means of a glass electrode. The cows in late pregnancy showed a variation between pH 7·0 and 8·8. After calving, the range was about the same, but tended to be lower. With the heifers the oestrus cycle was covered at different seasons of the year. The results are not conclusive, but indicate that the ovary does not exert a direct influence upon the secretions of the vaginal walls. The one constant feature of the readings, with one exception, was that the pH was at or above seven during oestrus. This, however, may be due to the copious cervical secretion during oestrus, which is more alkaline than that of the vagina. Usually the readings were between six and seven. Two heifers which were spayed varied within narrower limits than normal heifers.—A. T. P.

Amoroso, E. C., Griffiths, W. F. B., & Hamilton, W. J. (1939). **Living Tubal Ova of the Goat.**—*Vet. Rec.* **51.** 1009-1010. 4 figs., 1 table. [10 refs.]

Photographic records of living ova recovered from the Fallopian tube of the goat illustrate the earliest possible stages of the fertilized ovum. Three stages are shown, the uncleaved ovum, with a small perivitelline space; the two-celled stage, with unequal blastomeres, and the four-celled stage, with an appreciable perivitelline space. Evidence produced suggests that the first cleavage takes place about 31 hours after coitus.—C. W. Ottaway.

TECHNIQUE AND APPARATUS

Nichols, R. E. (1939). **A New Instrument for Automatically Recording the Erythrocyte Sedimentation Rate and the Volume Percentage of Cells and Plasma upon a Single Permanent Record.**—*J. Lab. clin. Med.* **24.** 631-635. 2 figs. [2 refs.]

None of the accepted methods of recording the rate of sedimentation of red blood corpuscles accurately measure all phases of the rate of descent of the dividing line between cells and plasma. Making use of the fact that light passes through plasma but not through cells, N. has devised an instrument which records this descent photographically. The apparatus consists of a light-proof box containing a source of illumination, a Wintrobe haemocrit tube containing the column of blood, a photographic lens, and a revolving drum on which is sensitized paper. The light passes through the column of sedimenting blood through the lens on to the sensitized paper. The paper records the amount of light which is allowed to pass the tube of blood, depending on the height of the column of plasma. The final readings on the paper form a permanent record in the form of a sigmoid curve. The volume of packed cells after centrifugation may also be photographed in a similar manner.—D. L. Hughes.

Prickett, C. O., & Stevens, Cornelia. (1939). **The Polarised Light Method for the Study of Myelin Degeneration as Compared with the Marchi and Sudan III Methods.**—*Amer. J. Path.* **15.** 241-250. 19 figs. on 3 plates. [6 refs.]

It was found that myelin degeneration in cross-sections of nerves of rats was more easily demonstrated when the preparations were fixed in 10% neutral formalin and examined in polarised light, than when ordinary light was used on sections prepared by the Marchi method or stained with Sudan III.—C. W. Ottaway.

I. Ryu, E. (1938). **On a Simple Staining Method of Metachromatic Granules in Animal Pathogenic Organisms.**—*J. Jap. Soc. vet. Sci.* **17.** 208-209 of pt. 1. 2 figs. on 1 plate. [3 refs.] [In Japanese: Abst. from English summary pp. 33-34 of pt. 2].

II. Ryu, E. (1938). **On the Gram-Differentiation of Bacteria by the Simplest Method.**—*Ibid.* 205-207 of pt. 1. [In Japanese: Abst. from English summary, pp. 31-32 of pt. 2].

I. The staining solution is a mixture of saturated aqueous solution of potassium alum (50 c.c.), and saturated alcoholic solution of crystal violet (10 c.c.). The preparation is stained with the solution for 1-3 minutes, and washed with water. The granules are coloured purplish-black.

II. A thick dried smear is covered with either 5% phenol or water and, while wet, is passed through a bunsen flame several times, the preparation being shaken between times. In the case of Gram-negative bacteria, a " clouding substance ", whirls up like smoke from the film; no such change occurs with the Gram-positive bacteria. R. also mentions that when a culture film is stained with an aniline dye, smears of Gram-positive organisms show as a distinctly stained film, while films of Gram-negative bacteria are either indistinct or pale.—S. G. I.

Schoop, G. (1939). Züchtung von Nekrosebakterien. [**Cultivation of " Necrosis Bacteria "**].—*Dtsch. tierärztl. Wschr.* **47.** 433-434.

Using Fortner plate cultures with serum or blood agar, 40 strains of " Necrosis bacteria " were obtained in pure culture from a variety of animals. The colonies were colourless or light grey and up to 1 mm. wide after 48 hours' incubation. Five strains were tested for viability and it was found that all lived at least 14 days.—P. S. Watts.

Umeno, S., & Nobata, R. (1939). **On a Culture Medium Suitable for Simple Isolation of *Streptococcus equi* from Strangles Materials.**—*Jap. J. vet. Sci.* **1.** 301-307. 1 plate. [6 refs.] [In Japanese: abst. from English summary].

The authors used a lactose-blood-agar containing 1% water-blue " Unna " (Grübler) to differentiate *Str. equi* from *Str. pyogenes*, which latter is often associated with *Str. e.* in strangles material. On this medium the lactose-fermenting *Str. pyogenes* develops a deep blue colony surrounded by a clear haemolytic zone 36-48 hours after inoculation, while the colony of the non-lactose fermenting *Str. equi* remains colourless.—J. R. Lawson.

Tilley, F. W. (1939). **Bactericidal Efficiency of Certain Aniline Dyes.**—*J. agric. Res.* **58.** 941-946. 3 tables. [1 ref.]

A number of dyes were tested at various dilutions over periods of time up to 60 minutes. The organisms used were *Bacterium coli*, *Salmonella pullorum*, *S. cholerae-suis*, *S. typhi*, and *Staph. aureus*. Most of the dyes were found to be more active against *Staph. aureus* than against the Gram-negative organisms.

In combination with phenol a better effect was obtained on the Gram-negative group and this was most marked in the case of crystal violet on *B. coli*.—W. J. I.

Himmelfarb, J. K. (1937). Modifikatsiya metoda opredeleniya podvizhnosti bakteriĭ po Levinthal dlya diferentsiatsii batsill chumy i psevdotuberculeza gryzunov. [**Modification of Levinthal's Method for the Demonstration of Motility of Bacteria in Differentiating between** *Pasteurella pestis* **and** *Past. pseudotuberculosis rodentium*].—*Rev. Microbiol., Saratov.* **16.** 273-280. [Numerous refs.] [French summary].

Experiments with ten strains of *Past. pseudotuberculosis rodentium* and five strains of *Past. pestis* confirmed the findings of other authors quoted, regarding the motility of *Past. pseudotuberculosis rodentium* as a means of distinguishing it from *Past. pestis*.—E. Martin.

Faust, E. C., Sawitz, W., Tobie, J., Odom, V., Peres, C., & Lincicome, D. R. (1939). **Comparative Efficiency of Various Technics for the Diagnosis of Protozoa and Helminths in Feces.**—*J. Parasit.* **25.** 241-262. 3 figs., 4 tables. [14 refs.]

Faust and his co-workers present a critical comparison of 11 different methods of examining faeces, two by direct smears, and nine by the use of a basic suspension, made by diluting faeces with four times their weight of physiological saline and straining through a 40-mesh sieve. Five of the latter methods involved concentration by centrifugal flotation with sodium chloride solution, S.G. 1·2; or zinc sulphate solution S.G. 1·18. A total of 271 samples of human faeces were examined by each method, a standard time of ten minutes being allowed for the examination of each slide.

The most efficient technique was found to be the $ZnSO_4$ centrifugal flotation, followed by either loop-removal or touch-removal [touching slide to raised meniscus]. Loop removal was more efficient for *Giardia* cysts, whipworm eggs and *Strongyloides* and hookworm larvae. By combining results from this method with those of either of the direct smear techniques, *i.e.* iodine or haemotoxylin stained smears (in order to detect unencysted protozoa), 80-85% of protozoa and helminths could be detected.

Brine flotation was unsatisfactory because of the distortion caused to protozoa, and the method of centrifugation with a superimposed cover glass was discarded as it was found to be no more accurate than loop-removal, and it was much more troublesome.—K. Sanderson.

Green, C. A. (1939). **Steel Ball Mill for Bacteriological Purposes.**—*J. Path. Bact.* **49.** 434. 1 fig. on 1 plate.

The frequent breakages and loss of material associated with the use of glass mills are, it is claimed, eliminated by the steel mill described by the author. The body of the mill consists of a steel cylinder fitted with detachable, recessed end pieces, into the end of one of which the shaft is threaded. During grinding processes the cylinder is almost filled with $\frac{3}{8}$ inch steel ball-bearing balls, and around it may be fixed an outer jacket for holding solid carbon dioxide. The apparatus is easily cleaned and sterilized by autoclaving.—J. R. Lawson.

Ramsey, Eva W. (1939). **Use of the Marginal Punch Card in Tabulating Vital Statistics Data.**—*Amer. J. publ. Hlth.* **29.** 907-909.

A simple and inexpensive method of sorting cards (without the use of mechanical equipment), for the compilation of statistical information, is described. The

cards contain holes and have one corner removed to facilitate and denote correct packing. Notches are punched in specified positions around the holes and, by the insertion of a sorting rod into the notches, all cards identically punched may be speedily removed when required.

R. uses a card containing 90 holes, providing for over 800 separate classifications. Division and sub-division into all possible groups can be effected at the rate of 5,000 an hour.—H. E. Bywater.

MISCELLANEOUS

Nickel, R., & Gisske, W. (1939). Blut- und Lymphgefässsystem des Darmes als Infektionspforte. II. Dringen Bakterien vom Darm in die Pfortaderkapillaren ein? [**The Blood and Lymph Vascular Systems of the Intestines as Infection Atria. II. The Portal Vein Capillaries**].—*Dtsch. tierärztl. Wschr.* **47.** 434-435. [5 refs.] [For part I see *V. B.* **9.** 879].

In a series of rabbits, piglets, calves and in a dog the thoracic duct was ligatured just before its passage through the diaphragm and was incised at the abdominal side of the ligature to allow of examination of its contents. Gastrotomy was performed and a tube pushed into the duodenum and fixed in a position behind the entrance of the bile duct. Broth containing *Salmonella typhi-murium* and once, *Bact. prodigiosum*, was introduced through the tube in such a manner that accidental contamination of tissue and backflow to the stomach were avoided. Immediately after infection and at three-minute intervals blood from the portal vein and lymph from the incised end of the lymphatic duct were examined. At longer intervals blood from an auricular vein and from the aorta was also inspected. The animals were killed 35-40 minutes after infection, and pieces of the lungs, liver, spleen and of the duodenal and jejunal lymph nodes were examined, as well as lymph from the occluded part of the thoracic duct before its connexion with the general circulation, and the contents of the intestine. The bacteria were found in the portal vein and intestinal lymph one minute after introduction, but at the time of death they had almost disappeared from the vein although they remained in considerable but diminished numbers in the lymph. Elsewhere they were invariably found, but never in the ligatured anterior section of the thoracic duct.

Bacteria, then, can pass from the intestine in the lymph to the portal vein direct to the liver and thus to the general circulation.—G. Williamson.

I. Teodoreanu, N. I. (1938). Influence des climats sur la constitution, la résistance et le rendement des animaux domestiques. Acclimatation. [**Influence of Climate on Constitution, Power of Resistance and Yield of Domestic Animals. Acclimatization**].—*Rep. 13th int. vet. Congr. 1938.* **2.** 925-934. 2 tables. [11 refs.] [In French: English, German and Italian summaries. Discussion pp. 1011-1015 in English, French, German and Italian].

II. Stencl, F. (1938). Akklimatisationserscheinungen betreffend Konstitution, Widerstandskraft und Leistung der Pferde. [**Constitution, Power of Resistance and Work Capacity of Acclimatized Horses**].—*Ibid.* 981-988. [8 refs.] [In German: English, French, German and Italian summaries. Discussion pp. 1011-1015 in English, French, German and Italian].

III. Letard, E. (1938). De l'étendue qu'il convient de donner au sens du mot climat. Comment concevoir les études de climatologie zootechnique. [**Scope of the Word Climate and its Use in Zootechny**].—*Ibid.* 989-999.

[16 refs.] [In French : English, German and Italian summaries. Discussion pp. 1011-1015 in English, French, German and Italian].

I. The effect of tropical conditions on imported cattle is shown by a reduction in weight and size and a reduction in their productive capacity. Small breeds such as Aberdeen-Angus and Jersey cattle acclimatize more easily than the larger breeds. The type of coat and skin is of the greatest importance, those animals with short hair and pigmented skin being the most suitable. The best cross-breeding results have been obtained between Zebu cattle and European breeds.

In Rumania, the importation of high grade western European stock has often been unsuccessful owing to the fact that in a few generations the animals became small and failed to breed. This is true particularly of Shorthorn cows, though the bulls acclimatize more readily. Friesian sheep and Yorkshire pigs also fail to become acclimatized, but Karakul sheep and merinos have been successfully established.

II. Since the Great War large numbers of horses have been imported into Czechoslovakia, where the climate is of a central continental type. The best type of animal is medium sized with a deep, wide chest, short strong bone, and of good constitution. During the first year after importation, horses are subject to numerous diseases, particularly of the bones, tendons and feet, and an eczematous condition of the skin is frequently seen. The best age to import horses is when they have just reached maturity. The chief value of imported horses has been to improve the native breeds. Imported horses do not breed well even when acclimatized. It is suggested that exporting countries should exercise a more careful selection of the animals sent abroad.

III. The study of the action of climate on domestic animals has now become so complex that it should be regarded as a special branch of veterinary science. The factors affecting animals may be divided into three main groups :– (1) those strictly referable to climate and its effect on the flora and fauna ; (2) those due to the action of man and domestication, and (3) geographical and topographical factors. Their action on the animal may be direct, *e.g.* temperature, atmospheric pressure, humidity, etc., or indirect, *e.g.* food supply. Evidence is accumulating to show that the indirect factors are probably of greater importance than the direct ones. This is well illustrated by a study of milk yields of the same breed of cattle in different countries.—J. A. Nicholson.

Haines, R. B. (1937). **Microbiology in the Preservation of Animal Tissues.**— *Spec. Rep. Food Invest. Bd, Lond.* No. 45. pp. 85. 20 figs., 18 tables. [Numerous refs.]

As H. points out in his introduction, the successful storage of animal tissues is, in the first instance, an exercise in applied microbiology, and even slight fungal or bacterial growth may lead to loss of carcass quality. The first of the three parts into which this report is divided deals with the *ante-* and *post-mortem* access of bacteria to the tissues. The normal defences of living tissue against bacterial invasion are briefly discussed, together with the question of whether or not bacteria are normally present in living tissue, and in the latter connection it is concluded that the evidence favours the view that small numbers of bacteria do tend to penetrate the external bodily defences, but that they are constantly being removed. Invasion during life is profoundly influenced by fatigue and by the nature of the diet. The description of the factors governing bacterial invasion at or after killing is of great veterinary interest ; the influence of the condition of the animal prior to slaughter, the method of killing and bleeding, the sources of contamination on the killing floor, and the rate of cooling of the carcass are all critically discussed,

and there is a table comparing the respective bacterial counts obtained from the floor, air, and swabbing water of a private slaughter-house and of a public abattoir.

Part II is entitled " Some aspects of the physiology and biochemistry of bacteria and of the tissues of the host ". In effect, it may be said to consist of a summary of known laws of bacterial growth and metabolism, with special reference to their destructive effects upon animal tissues employed as foodstuffs.

Part III dealing with " The control of infection and growth ", discusses firstly the spoilage of meat and other animal products by bacteria, yeasts and fungi. Various practical suggestions are then made for reducing the degree of infection of carcasses within the abattoir, and among them is a strong deprecation of present methods of swabbing. The remaining sections are concerned with the control of micro-organismal growth, and consist of an up-to-date description of methods of sterilization, including the use of gaseous inhibitors. There is a useful table giving the germicidal and inhibitory concentrations of some 25 selected disinfectants.

This report maintains the high standard of previous Department of Scientific and Industrial Research publications ; it should prove valuable to veterinarians engaged in the relevant aspects of public health work and to those reading for university degrees or post-graduate diplomas in veterinary science.—A. N. W.

Wells, W. F., Wells, M. W., & Mudd, S. (1939). **Infection of Air. Bacteriologic and Epidemiologic Factors.**—*Amer. J. publ. Hlth.* **29.** 863-880. 1 text fig., 2 figs. on 2 plates, 3 tables. [Numerous refs.]

The authors examined stagnant air from subways, hospitals, theatres, railway carriages etc., and found high bacterial contamination. In many circumstances they found it impracticable to change the air by direct ventilation and in such cases the use of ultra-violet rays reduced the bacterial content to a surprising degree. The employment of U.V.R. screens or barriers is recommended and their use forms an efficient means of isolation of an infectious patient.—H. E. Bywater.

OFFICIAL AND OTHER REPORTS

Great Britain. (1939). **Annual Report of the Chief Medical Officer of the Ministry of Health on the State of the Public Health, for the Year 1938.** pp. vi+230. Numerous tables, 11 appendixes. London : H.M. Stat. Off. [8vo] [3s. 6d.]

General Diseases.—Rabies was diagnosed in a dog from the Sudan, which died in quarantine about a week after arrival in the United Kingdom. Two kennelmen were bitten two days before the death of the dog and antirabies treatment was begun immediately. Eight cases of Psittacosis in man were confirmed by evidence of the disease in birds.

Milk Hygiene.—From April 1st, 1938, veterinary duties under the Milk (Special Designations) Order were transferred to the State Veterinary Service of the Ministry of Agriculture and Fisheries. In the amending Order issued in 1938, local authorities were given power to require milk pasteurizing plants to be fitted with sufficient recording and indicating thermometers to ensure accurate control of processing. Further suggestions are made to overcome the differences in administration of the Ministry's Orders by local authorities.

Undulant Fever in New Zealand.—A short resumé of the position during the last ten years is given. As a general rule the disease runs a mild course. There are no reliable statistics as to the incidence of bovine contagious abortion, but certain routine agglutination tests of cows' blood and milk returned results of 35%

and 24·6% as positive respectively. The failure of infected raw milk to cause more cases in human beings is the subject of comment.

MEAT INSPECTION AND FOOD POISONING.—As many as 50% or more of poultry carcasses examined at markets have been found to be tuberculous; older birds are chiefly affected. Details are given of the method of inspection which should be followed by inspectors.

The number of food poisoning outbreaks reported to the department was 156, as compared with 94 in 1937; 139 were investigated at the Ministry's laboratory. Seventy-two outbreaks of SALMONELLA INFECTION were reported; a table shows the types isolated and identified. Food suspected included duck eggs, roast turkey, pork pies and brawn.

HYDATID DISEASE.—Information is given of an enquiry in Wales into the incidence of hydatid disease; the majority of the cases occurred in industrial districts. Between 1927 and 1936, 144 cases were admitted to hospital, and are dealt with in this article under such headings as source of infection, occupations of patients, breeds of dogs implicated and suggestions for control.—J. C. WALLACE.

GREAT BRITAIN. (1939). **Annual Report of the National Institute for Research in Dairying, University of Reading, for the Year 1938.** pp. 92. 5 tables. Reading: National Institute for Research in Dairying. [4to].

The report consists of two sections: the first deals with changes in staff, appointments, developments in the dairy industry, the financial position and the result of the appeal for funds for the new buildings, and the second gives the reports of the various departments.

The Institute herd was entered on the Roll of Attested Herds in December, 1937 and no reactors were disclosed at the herd test in June, 1938. The attempt to control contagious abortion by segregating reactors to the blood agglutination test continues to give encouraging results.

Research work by the Dairy Husbandry Department included such subjects as protein requirements of dairy cows, ketosis in dairy cows, raw and pasteurized milk in calf rearing, and nutritional anaemia of pigs; references to separate papers on the subjects are given.

The Bacteriological Department conducted experiments to estimate the comparative value of indirect tests in the diagnosis of mastitis, to test the theory that vitamin A deficiency in animals favours infection with some bacterial diseases, and to ascertain the survival period of bovine tubercle bacilli in butter.

The Physiological and Biochemistry Department continued work on the effect of commercial sterilization on the nutritional value of milk, on the nutritive value of dried and evaporated milk, and on vitamins.

Summaries of publications by the staff are given.—J. C. WALLACE.

UNION OF SOUTH AFRICA. CITY OF JOHANNESBURG. (1939). **Report of Director of Abattoir, Live Stock Markets, Veterinary Services, Ice and Cold Storage Department, for the period 1st July, 1937 to 30th June, 1938.** [IRVINE-SMITH, J.] pp. 36. 5 tables, 5 appendixes. Johannesburg: Radford, Adlington, Ltd. [fcp].

Over 800,000 animals were slaughtered during the year. Careful observations were made on the main predilection sites of cysticerci in 500 bovine measly carcasses. Tables show the incidence and number of cysticerci found in the incisions into various muscles.

Appendixes show the amounts of meat and offals condemned and the diseases

for which they were rejected. Particulars are given of the treatment of municipal animals and the inspection of dairy cows. 230 oxen and 30 mules were vaccinated against anthrax. 15,000 cows were inspected, and 290 samples of milk were tested in the laboratory.

A list of animals attended and autopsied in the Zoological Gardens is given. —F. J. ANDREWS.

SOUTHERN RHODESIA. (1939). **Report of the Chief Veterinary Surgeon for the Year 1938.** [MYHILL, B. A.] pp. 10. Salisbury: Government Stationery Office. [fcp].

There was only one outbreak of FOOT AND MOUTH DISEASE, and that of a very mild character. Measures were taken against its spread from Portuguese East Africa and the Kruger National Park of the Union. 2,500 head of cattle were carried by motor transport from infected areas to rail head for dispatch to abattoirs. There were four fresh outbreaks of EAST COAST FEVER, with 33 deaths. The total mortality during the year was 220. Although most districts have now been cleared of the disease, Melsetter district still remains infected. Cattle from this area were moved by motor transport to abattoirs. It is hoped eventually to clear the district by intensive veterinary supervision, fencing, dipping, etc.

Two cases of RABIES in dogs occurred in the Victoria Falls Area. Infection came from Northern Rhodesia. There had been no case in the Colony since 1913.

There were 14 outbreaks of ANTHRAX, with 100 recorded deaths. Over 88,000 inoculations were carried out.

Considerable losses occurred from HEARTWATER, but mortality can be checked by resorting to five-day interval dipping.

BLACKLEG was kept under control by immunization.

A few cases of TUBERCULOSIS occurred in imported dairy cattle and in abattoirs.—F. J. ANDREWS.

SOUTHERN RHODESIA. (1939). **Report of the Division of Entomology For the Year Ending 31st December, 1938.** [CHORLEY, J. K.]—*Rhod. agric. J.* **36.** 598-622.

The veterinary section of this report deals with the control of the tsetse fly. This was carried out according to a scheme laid down by the Government, the objectives of which were outlined in the report for 1937, and are here recapitulated.

The Chiswiti Reserve is reported as being free from *Glossina morsitans* at the time of writing. Little progress had as yet been made elsewhere throughout the year, as manifest results could not be expected before a lapse of two or three years. Unbridged and unfordable rivers, as well as the necessity for road-making, were found to increase the cost of operations considerably.

In the Doma area, formerly infested with tsetse, there were 1,800 cattle, and none of these had so far developed the disease.

Some anxiety was felt about the Melsetter district where *G. pallidipes* and *G. brevipalpis* were suspected to have invaded, and an aerial survey was commenced during the year.

SUDAN GOVERNMENT. (1939). **Annual Report of the Sudan Veterinary Service, 1938.** [WILLIAMS, H. B.] pp. 43. 7 tables. [fcp] [Mimeographed].

ANIMAL DISEASES.—There was nothing new to report. The common enzootic diseases, *viz*, rinderpest, contagious bovine pleuro-pneumonia, foot and mouth disease, African horse-sickness, rabies, and various forms of trypanosomiasis, were kept under reasonable control and nowhere became epizootic.

ANIMAL INDUSTRY.—A marked fall occurred in the number and value of all livestock exported to Egypt on hoof; the value of cattle and sheep (actual) fell from about £E.50,000 to about £E.35,000, and that of camels (estimated) from about £E.120,000 to roughly £E.90,000.

The value of exported hides fell from £E.117,000 to £E.60,000 and of sheepskins from £E.110,000 to £E.38,000. About 590 tons of clarified butter, valued at £E.33,000, were exported, mainly to Egypt, and a few tons of sheep " casings " (intestines) were exported to the same destination.

Livestock improvement continued along the lines of breeding up from selected indigenous stock. No English stallions, and only about a dozen Arabs remain, whereas about forty country-breds, all with some little Arab blood, are on the official books.

EDUCATION.—" Three students, who had completed their first year's study at the Kitchener School of Medicine (where chemistry, physics and biology are studied in the same classes as medical students) were enrolled for a further three years' course in purely veterinary subjects. Although this is the first year during which the School of Veterinary Science has operated, the course of instruction has constituted the second session of a four years' professional course. The course of study is designed not only with the marked bias towards tropical medicine and hygiene that is desirable for those who will spend their professional lives in tropical Africa, but also, in virtue of the infinitesimal opportunities that exist for private practice, incorporates a study of departmental administrative routine and local legislation, a thorough knowledge of which is essential to those destined for official careers "—S. C. J. BENNETT.

SUDAN GOVERNMENT. (1939). **Annual Report of the Senior [Veterinary] Research Officer, 1938.** [BENNETT, S. C. J.]—*Rep. Sudan vet. Serv. 1938.* pp. 28-43.

GENERAL.—" . . . with the increasing amount of time devoted by the Senior Research Officer (who is also Assistant Director) to administrative work, and the full preoccupation of the remaining staff with routine duties, no deliberate research has been undertaken ".

ROUTINE.—Mainly the preparation and issue of various biological products for field use. Just over 102,000 doses (of 50 c.c., = 5,100 litres) of rinderpest serum, and 117,000 doses of rinderpest vaccine were prepared. Nearly all the serum had to be destroyed on account of bacterial contamination, which was not inhibited by treatment with 0·6% phenol [see next paragraph]. A few thousand doses of virus were issued for serum—virus immunization. Only a little over 30,000 doses of contagious bovine pleuro-pneumonia vaccine were issued (as compared with a general average of about 50,000). " It appears that the disease is on the whole less prevalent than formerly ". For the control of camel trypanosomiasis, issues of naganol rose from 12,938 to 14,748 doses, of which 13,440 were administered to private owners on payment [about 11,000 in 1937]; issues of diagnostic materials for applying the mercuric chloride test rose in proportion. Issues of African horse-sickness neuro-vaccine rose from 360 to 507 doses and only five vaccinated horses subsequently died [3 out of 360 in 1937]. A new product prepared was foot and mouth disease virus, which was used for the deliberate infection by intralingual injection of cattle destined for export. If this is done when grass is green no ill effects beyond a transient falling-off in condition follow, and subsequent delays in quarantine parks are avoided. In addition to numerous diagnoses of banal conditions in routine specimens, *Aegyptianella pullorum* was detected in a turkey [new host] and there were four cases of equine conjunctivitis due to *Cryptococcus farciminosus*.

RESEARCH.—Studies on serum preservatives showed that while phenol or acriflavine alone in any practicable dilution did not prevent the multiplication of

local contaminating bacteria, the addition of so little as 1:80,000 of acriflavine (the highest dilution tested, but not necessarily the limit) to 0·5% phenol completely inhibited them. All serum henceforward will be treated with 0·5% phenol plus 1:50,000 acriflavine.

In 1936 the discovery of an akinetoplastic variety of *Trypanosoma evansi* was recorded. This year an even more puzzling variety has been encountered, namely, one in which the proportion of individuals possessing a kinetoplast fluctuates from only two or three to over 90%. In the original camel (a privately owned beast treated and lost to view) the trypanosomes were " typical ", but on passage in laboratory animals the fluctuation became apparent.

Uganda Protectorate. (1939). **Annual Report of the Veterinary Department for the Year Ended 31st December, 1938.** [Poulton, W. F.] pp. 32. 4 tables, 5 appendixes. Entebbe: Govt. Printer. [8vo] [Sh.1/50].

Staff.—The British Veterinary staff numbered 14, including two research officers.

Animal Diseases.—Anthrax is localized in Ankole and Masaka, but Blackleg is widely distributed throughout the Protectorate. Trypanosomiasis is widespread in the Western Province, Acholi District and part of Buganda. Although antimosan and " surfen C " have been found to be valuable experimentally they are not suitable for large scale use. Cattle owners tend to confuse trypanosomiasis with ill-health due to salt deficiency and trypanosomiasis tends to be spread when cattle owners take their stock to salt licks. One outbreak of East Coast Fever was recorded at Adachal, Teso. Details are given of the campaign against Rinderpest. At the end of 1937 this disease was widespread. Difficulties of control were met with in game areas and the present policy includes the avoidance of double inoculation unless this is the only possible course. As eradication of rinderpest was impossible, control measures took the form of the systematic creation of blocks of immune stock at strategic points where, owing to topographical conditions, the absence of game, or some such favourable factor, the advance of the disease could be checked.

The work on *Glossina* investigation and reclamation was continued. A new centre at south-west Kashiri was discovered.

The report concludes with sections dealing with other aspects of animal industry.—J. C. Wallace.

Uganda Protectorate. (1939). **Annual Report of the Senior Veterinary Research Officer, Entebbe, for 1938.** [Carmichael, J.]—*Rep. vet. Dep. Uganda, 1938.* pp. 18-27. 1 table.

Laboratory products issued were :– rinderpest serum 2,353 litres, and rinderpest glycerinated spleen vaccine 171 litres. The total routine examinations of material for diagnosis numbered 8,120.

In research on rinderpest attempts were made to propagate the virus on chick-embryo extract plus ox-serum-tyrode mixture and on chick-embryo spleen plus serum-tyrode mixture, but they were all unsuccessful. Failure was also experienced with the chick-embryo chorio-allantoic membrane method. An experiment indicated that rinderpest virus is destroyed by freezing and drying at a temperature of –14°C. for 6-7 weeks in a vacuum of one atmosphere. A preliminary attempt to make a vaccine by using virus dried for up to six weeks over calcium chloride gave inconclusive results. Virus was found to be present in the cerebro-spinal fluid of one animal on the fifth day of reaction to rinderpest virus. Filtration tests

further showed that the virus was present in the cells of the C.S.F. but not in the filtered fluid. Studies showed that the hedgehog (*Erinaceus albiventris*) is not susceptible to rinderpest and that attenuation of the virus occurs by passage through the bush pig.

Research on trypanosomiasis brought to light an infection of a young sitatunga by *Tryp. uniforme* and *Tryp. vivax*. The blood of this animal failed to infect calves. A case of spontaneous recovery from *Tryp. congolense* infection in a bovine is recorded. " Surfen C " was found to be promising against *Tryp. vivax* but not against *Tryp. congolense*.

In research into East Coast fever and " turning sickness " it was found that calves could be infected with East Coast fever by the agency of ticks brought in from a distance on cut green fodder. Sixteen cases of " turning sickness " were investigated. In one case *Tryp. theileri* was found to be present in a lesion in the brain. It was found that in " turning sickness " the cerebro-spinal fluid had an increased cell content (up to 500 or more per c.mm.), and an increase in globulin and in total protein (up to 0·4%). An attempt to transmit " turning sickness " with cerebro-spinal fluid by intrathecal injection gave an inconclusive result.

Work on tuberculosis is referred to. Particulars have been published elsewhere.

Rickettsia infection in dogs has been diagnosed in Uganda; proseptasine (M. & B. 125) effected recovery in 48 hours in many cases.

Acaprin was found to be efficacious in piroplasmosis in dogs, and " allegan " efficacious in strongylosis in horses.

Notes are given on experimental infection with *Streptothrix farcinicus* in cattle and on a salmonella organism isolated from sheep.

Fowl leucosis was diagnosed for the first time in Uganda.

A list of publications is given.—J. C. WALLACE.

MAURITIUS. (1939). **Report of Veterinary Division, 1937.** [LIONNET, F. E.] —*Rep. Dep. Agric. Mauritius, 1937*. pp. 54-57.

The control of TRYPANOSOMIASIS forms the chief work of the veterinary department. Of 17,000 blood smears examined, 65 showed trypanosomes (*Tryp. evansi* in 38 and *Tryp. vivax* in 27). Eleven equines were treated with naganol; 27 bovines, affected with *Tryp. evansi*, were treated with atoxyl and arsenious acid or tartar emetic; and bovines affected with *Tryp. vivax*, with tartar emetic alone. All are said to have been cured. All animals in an infected herd are considered infected and treated accordingly.

Thirty-two cows and heifers were tested for tuberculosis, and there were two positive and two doubtful reactors. The preparation of BCG vaccine for bovines has now ceased, but 810 doses were issued during the year.

FOWL POX vaccination and preventive measures against FOWL CHOLERA gave satisfactory results. No details are given.

Four cases of ABORTION occurred among government dairy cows. Streptococci detected in the blood of the foetuses are said to have been the cause.—F. J. A.

—. (1939). **Report on the Work of the Health Organisation between June 1938 and April 1939 and on Its 1939 Programme.**—*Bull. Hlth Org. L.o.N.* **8.** 1-142. [Numerous refs.]

As the three-year plan of the Health Committee extended to the end of 1939 its results could not be ascertained until the end of that year. Its object is to provide data and information to public health administrations, as well as to attain

some measure of international uniformity in standards, units of measurement, terminology, etc. The basis of its activities is, therefore, international collaboration.

The first section of the report deals with prevention and treatment. Under this heading rabies is the only subject of veterinary interest. To celebrate the fifteenth anniversary of the introduction into Rumania of antirabies vaccination an international conference was held at Bucharest in 1938. Closer co-operation was urged between the antirabies institutes of central and eastern Europe. A further world conference was arranged to take place in the near future. It was also decided that the analytical reviews of the results of antirabies vaccination are henceforward to be prepared only every two years.

Under the same heading the standardization of the anterior pituitary hormones is reported. That of the gonadotropic hormone was fixed, while it was hoped that the standards of the thyrotropic and lactogenic hormones could be fixed in the near future. It was considered impossible to standardize the other hormones in the present state of knowledge.

The Committee recommended the adoption of the terms " corticotrophin " and " thyrotrophin " to denote the active principles of the anterior pituitary which act on the adrenal cortex and on the thyroid gland.

The last section is devoted to a report on Rural Housing and Planning, in which hygiene of outbuildings in farms, as well as that of dwelling houses, is dealt with.

BOOK REVIEWS

WIGGLESWORTH, V. B. [M.A., M.D., F.R.S., Reader in Entomology in the London School of Hygiene and Tropical Medicine]. (1939). **The Principles of Insect Physiology.** pp. viii+434. 316 illustrations. [Numerous refs.] London: Methuen & Co. Ltd. [8vo] [30s.]

The need for a general text book on insect physiology has been growing increasingly insistent for some time. The available information has consisted mainly of a mass of unrelated facts and isolated, sometimes conflicting, observations, and little attempt has previously been made to relate such individual results to a general scheme of physiological principles.

The author has collected this information so as to present a coherent account of the various physiological processes and activities of insects, in a well balanced book which will be welcomed alike by the general student and the specialist. To the growing number of workers on problems of economic entomology the importance of the book is best expressed by the following sentence from the preface : "A knowledge of the ecology of a species is always necessary to its effective control ; its ecology can be properly understood only when its physiology is known ".

Over half the text is devoted to individual processes such as digestion and excretion, respiration, circulation, and behaviour of whole organisms, with a special chapter on water and temperature relations. Development, growth and reproduction are discussed in 81 pages, while 87 pages are given to a description of the integument, the muscular and nervous systems, and the sense organs. Morphological structure is described in sufficient detail to make clear the physiological argument, but the book is essentially a physiological and ecological treatment of entomology, and form is throughout subordinated to function.

An outstanding and welcome feature of the work is the thorough manner in which throughout the text each statement is supported by references, lists of which are given at the end of each chapter. The text contains altogether over 2,000 references.

Exigencies of space have doubtless influenced the decision to confine the subject matter to entomology in the strict sense. Yet, to the teacher, the field worker and the applied entomologist, the study of ticks and mites has become an inseparable part of entomology, and it is to be hoped that in later editions the scope will be widened to include the physiology of acarina, at least to such an extent that the student can relate his individual findings to general physiological principles.
—J. MacLeod.

Parsons, T. R. [B.Sc. (Lond.) M.A. (Cantab.), Sidney Sussex College, Cambridge]. (1939). **Fundamentals of Biochemistry in Relation to Human Physiology.** pp. xii+461. 26 figs. [Numerous refs.] Cambridge: W. Heffer & Sons Ltd. [6th Edit.] [8vo] [10s. 6d.]

This popular textbook has now reached its sixth edition, and, apart from various amendments in places where the previous issue required revision, the only new feature is the incorporation of a chapter on sterols. The work as a whole serves as a theoretical introduction to biochemistry and only a minimum knowledge of pure chemistry and physics is assumed. As the author points out, no single book can even half suffice for the intelligent reading of any subject, and his desire is that any merit this book may possess " may result from its containing *less* of information rather than more than other books contain ". Consequently, wealth of detail is conspicuously absent and, though a wide field is covered, only the bare facts are included. These facts, however, are presented in a most lucid and readable manner; the exposition of the subject matter is carried out in a pleasant manner so that the book serves as an admirable introduction to biochemistry for the average student.

Because of the omission of much detail from the text itself, the author has included at the end of each chapter a selected list of references to other books and original papers from which the necessary details may be readily secured. One criticism that may be advanced is that a fair proportion of these references is in German, a language with which the average student reader is unfortunately poorly acquainted. Sufficient of the references are, however, to standard textbooks and the more accessible scientific journals.

The book covers, in the general way indicated, proteins, purines, lipides, sterols, carbohydrates, energy requirements, enzymes and oxidative catalysts, vitamins, detoxication, respiratory pigments and gases, and some applications of physical chemistry including osmotic pressure, colloids, absorption and pH.

For its modest size, this book, read in conjunction with some of the selected references, should prove as equally invaluable to students of the fundamentals of biochemistry in the future as it has proved to successive classes since it was first published in 1922.—Alfred Eden.

Darlington, C. D. [Head of Cytology Department, John Innes Horticultural Institution]. (1939). **The Evolution of Genetic Systems.** pp. x+149. 25 figs. [Numerous refs.] London: Cambridge University Press. [8vo] [10s. 6d.]

This book is a very explicit account of the basic theory of heredity and variation, embracing the most recent developments of the cytological aspect of genetical research. D. states in the preface that the only means of making sense of biology as a whole is by a combination of the chromosome theory with the evolutinary framework, and throughout the book he consistently and successfully develops this thesis. In 21 chapters he lucidly discusses chromosome cytology and mechanics, and their relationship to evolution.

The book presupposes some previous knowledge of genetics and this is necessary in order that it may be read intelligently. The material is arranged in short chapters, some of which could advantageously be expanded to include a fuller exposition of their subject matter, especially since some of the views expressed are of an original nature.

The diagrams are of a high standard and contribute greatly to the understanding of the text. There is an excellent bibliography and the book is adequately indexed.

—N. J. SCORGIE.

ANON. (1939). **Vitamin E.** A Symposium Held under the Auspices of The Food Group (Nutrition Panel) of the Society of Chemical Industry on Saturday, 22nd April, 1939, at the London School of Hygiene and Tropical Medicine, Keppel Street, London, W.C.1. pp. vii+88. 2 figs., 12 tables. [Numerous refs.] London: Society of Chemical Industry. [8vo] [5s.]

This monograph is divided into three parts, corresponding to the arrangement of the papers and discussions at the actual conference.

Part I, " The Chemical Structure and Properties of Tocopherol (Vitamin E) ", deals with the identification, structure, synthesis and chemical determination of the vitamin, and is an adequate tribute to the wealth of relevant information which has been made available during recent years.

Part II, " The Physiological Action of Vitamin E ", and the Consequences of Vitamin E Deficiency ", consists of a most interesting series of papers by leading workers in this field, and although more than one speaker referred to the fact that knowledge of the physiological role of the vitamin now lags far behind that of its chemistry, it is evident that much is being done to increase it, in so far at least as the rodent is concerned. The relationship of vitamin E to reproduction in both sexes, and to the pituitary and other endocrine glands, is ably reviewed, as are the various changes in the organs and tissues which occur during vitamin E deficiency. MASON pointed out that evidence as to the susceptibility of the domestic fowl to a deficiency of vitamin E is based upon the use of mixed-food diets treated with ferric chloride in ether solution to destroy any of the vitamin present; he added that different types of adequate diets, after subjection to the same ferric-chloride : ether treatment, had in his own experience shown considerable variation in their ability to induce impairment of reproductive function in the two sexes of the rat, and emphasized the need for caution in interpreting results obtained through the use of diets treated in this drastic fashion. The same speaker, in referring to the apparently far higher vitamin E requirements of the female rat, stated that he had satisfactorily demonstrated vitamin E deficiency in the albino mouse, and that here the sex difference would appear to be even more marked. DRUMMOND briefly referred to the fact that the goat appears to be independent of vitamin E.

The subject-matter of Part III, " Clinical and Veterinary Uses of Wheat Germ Oil and Vitamin E Preparations ", is in somewhat disappointing contrast to that of the preceding sections. VOGT-MÖLLER claimed that he had now utilized wheat germ oil in the treatment of upwards of 1,200 cows affected with " non-infectious barrenness " (sterility and abortion), and that 75% of these animals had become pregnant, a figure almost equalled in the case of barren sows similarly treated. He alluded also to his employment of wheat germ oil in the treatment of cows infected with *Brucella abortus*, but stated that the numbers were still too small to permit of any definite conclusions, a statement which must hold also for the few experiments recorded with mares and bulls. The claims made for the value of vitamin E therapy in women were succinctly dealt with by BROWNE, who pointed out that, *e.g.*, in the treatment of habitual abortion, the 75% successes ascribed to

vitamin E have been equalled where apparently unrelated substances such as progesterone, vitamin C or pregnancy serum have been employed, and indeed, that in this condition the adoption of simple measures alone is probably as efficacious as any specific treatment. [While there is no similar criticism from the veterinary standpoint, one cannot but feel that the therapeutic value of vitamin E must rest on a firmer basis than any yet established, especially in the case of species of which the vitamin E requirements, if any, have yet to be evaluated].—A. N. WORDEN.

—. (1939). **A Symposium on the Blood and Blood-Forming Organs.** pp. viii + 264. Numerous figs., tables, graphs. [Numerous refs.] Madison: University of Wisconsin Press. [8vo] [$ 3·50].

This book consists of a collection of contributions to a meeting of haematologists held at the University of Wisconsin. A list of the contributors is in itself impressive; amongst other names the list includes MINOT, THOADS, DOAN, DOWNEY, FORKNER, FURTH and MEULENGRACHT. The following articles should be of interest to veterinarians :– " The Porphyrins and Diseases of the Blood " by WATSON, "Anaemia due to Iron Deficiency " by HEATH, "Anaemias of Nutritional Deficiency " by MINOT, contributions on " Leukaemia " by FURTH and FORKNER and " The Reticulo-Endothelial System " by DOAN. While of necessity this book cannot be regarded as a text-book, it should be read by all those who desire to keep abreast of recent haematological developments.—D. L. HUGHES.

—. (1939). **Agriculture in the Twentieth Century. Essays on Research, Practice and Organization to be Presented to Sir Daniel Hall.** pp. viii + 440. 3 figs., 7 tables, 2 charts. London : Oxford University Press. [8vo] [15s.]

This is a *Festschrift* contribution by friends of Sir Daniel Hall and consists of 15 essays on various aspects of agriculture in the British Isles, with special reference to the changes which have taken place in the last half century. Veterinarians in the United Kingdom and in certain overseas territories are well aware of the important positions he has held in the government service and of the extent to which he has influenced the development of government veterinary administration and research. Two chapters, on animal nutrition and milk production, are of indirect veterinary interest, and brief reference is made on p. 117 to veterinary research.—J. E.

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